Spatial proximity, social capital and social status

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Spatial Proximity, Social Capital and Social Status: A Livelihood Approach

PROEFSCHRIFT

ter verkrijging van de graad van doctor aan
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op gezag van de rector magnificus,
prof. dr. E.H.L. Aarts,
in het openbaar te verdedigen ten overstaan van een
door het college voor promoties aangewezen commissie
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op maandag 28 november 2016 om 16.00 uur

door
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geboren op 26 oktober 1982 te Mekelle, Ethiopië.

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Aradom.

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DEDICATION

This dissertation is dedicated to my beloved wife, Elsa Teklay and my little angels, Biruk Aradom and Bethel Aradom.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVATIONS

AIC…….Akaike Information Criterion
ATT…….Average Treatment Effect
BIC……..Bayesian Information Criterion
CSA…….Central Statistical Agency of Ethiopia
ETB…….Ethiopian Birr
FAO……Food and Agriculture Organization of the United Nations
HSPM…….Hinterlands Spatial Proximity Model
IMF…….International Monetary Fund
IV……Instrumental Variable
JEL……..Journal of Economic Literature classification code
LCA…….....Latent Class Analysis
Npar……Number of parameters
OLS…….Ordinary Least Square
PPS……..Probability Proportionate to Size technique
PSM…….Propensity Score Matching
SSLM……A Social - Spatial Livelihood Matrix
TLU…….Tropical Livestock Unit
2SLS…….....Two Stage Least Squares regression model
USD…….United States Dollar
VIF…….....Variance Inflation Factor

1 INTRODUCTION

1.1. An overview

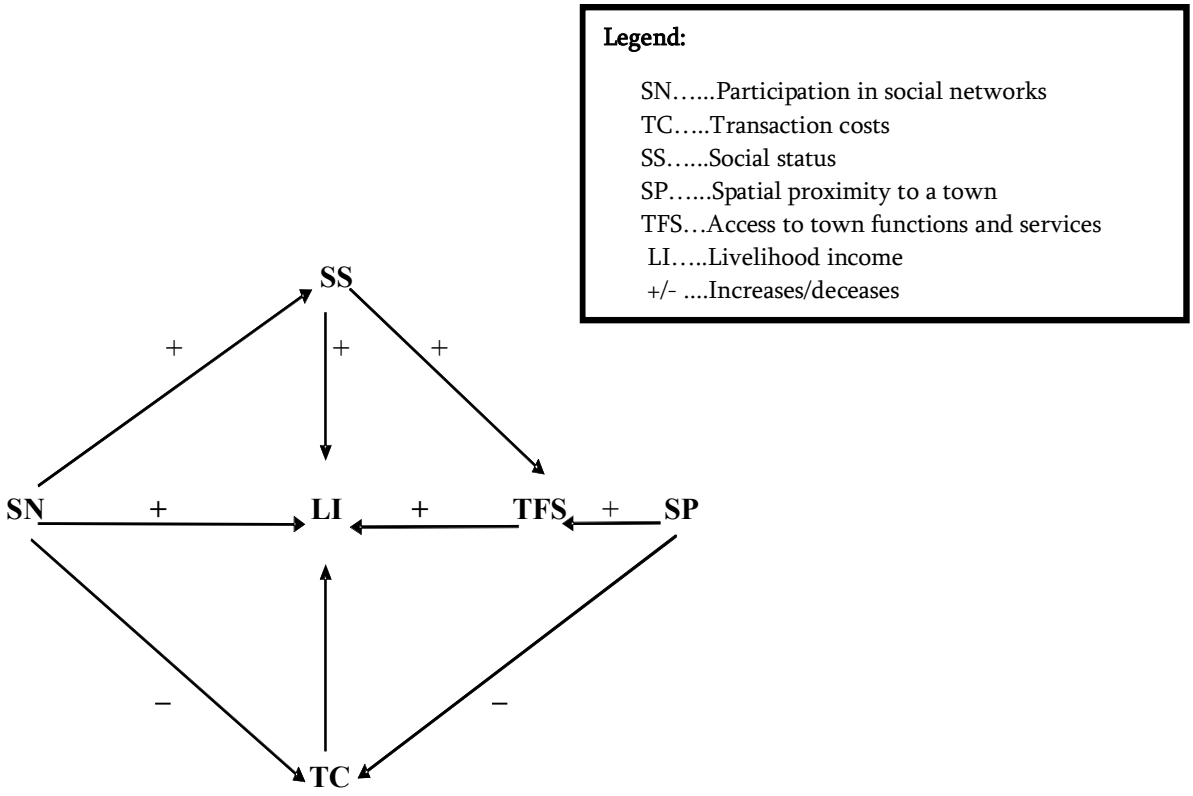
Rural development has become a primary strategy for improving the standard of living of the rural poor in developing countries. These days with high economic, social, technological and political dynamism, there is a growing movement to promote rural development through rural-urban linkage (Rezvani, Shakoor, Ronizi, & Roshan, 2009). Rural-urban interactions essentially spring from the two spatial units commonly known as *urban* and *rural* areas. One form of the typical interaction between these two spatial units is the role that small urban centers play in promoting rural livelihoods (Hinderink & Titus, 2002). Of course small urban centers play crucial roles in rural development by acting as market centers (Courtney, Mayfield, Tranter, Jones, & Errington, 2007; Dries, Reardon, & Swinnen, 2004; Reardon & Berdegue, 2002; Reardon, Timmer, & Berdegue, 2004; Weatherspoon & Reardon, 2003), centers of off-farm employment (Hazell & Haggblade, 1990; Wandschneider, 2004) and hubs for consolidating farm and non-farm activities (Satterthwaite & Tacoli, 2003). But mere identification of these roles is not a sufficient condition to bring sustainable rural development. Rather, it is necessary to understand the different particulars and the nature of the interaction existing between these two spatial units. Especially core factors such as rural households' spatial proximity to urban centers, social capital and households' social status are of a paramount importance.

While the contemporary sociological and economics literature provides valuable insights into the livelihood benefits of households' spatial proximity to small towns, degree of participation in social networks and status, there are several areas in which theoretical

explanations and empirical evidence are rather scarce. First, while research on regional development provides detailed evidence on the effect that spatial proximity to towns has on rural livelihoods, it is still imprecise on what livelihood strategies are used by rural people living in a relatively farthest hinterlands to use the town services. Second, despite the fact that the effects of participation in social networks on the livelihood income of the rural households have often been stated in the literature (Putnam, 1995; Putnam, Feldstein, & Cohen, 2004; Westlund & Adam, 2010), studies to date have merely looked into the nature of the networks (Malecki, 2012) without addressing the economic aspect of the relation in a spatial sense. Third, in spite of the fact that the issue of social status in an economic sense and the mechanisms to attain it are widely discussed in a developed countries context, scant scholarly attention has been paid to addressing its economic implications and the factors affecting it from a developing countries perspective. Specifically, little is known to identify what variables are apt to denote rural households' status in developing countries context other than those indicators attributed to developed nations. In an attempt to address the aforementioned gaps, the three papers in this thesis provide detailed theoretical and empirical evidence from a livelihoods perspective in a developing countries context.

1.2. A theoretical framework

Figure 1.1: Spatial proximity, social networks, social status and livelihoods



Source: Constructed by the authors

The theoretical framework in Figure 1.1 is constructed as a point of departure for the three chapters covered in this dissertation. It rests mainly on three assumptions. First, rural households' spatial proximity to small towns improves livelihood income by increasing households' access to the functions and services found in the towns. Second, rural households' participation in social networks enables them to reduce market transaction costs resulting from distance and thereby improve their livelihood income. In this case, the emphasis is on assessing whether or not the rural households living in distant hinterlands

use social networks as a livelihoods strategy to partly lessen the adverse effect of distance or not. Third, rural households' social status as instrumented by households' participation in social networks increases livelihood income. These three assumptions, thus, will be centers of debate in the subsequent three chapters of this dissertation.

1.3. Outline of the dissertation

As mentioned above, this dissertation consists of three journal articles that examine how rural households' spatial proximity to small towns, their social capital and their social status affect their livelihoods. While the chapters can be read independently, this likewise creates some overlap. Generally, the findings of each chapter are used as platforms for each successive chapter. These helps us to draw a broad picture of the key findings and to concretely understand the overall message of the dissertation.

In Chapter 2, we focus on explaining the effect of spatial proximity to small towns on the income of the surrounding rural people. More precisely, we study the effects of distance on the income of households living at different distances from a town. To do so, on the substratum of the treatment factor of average walking time spent to reach the selected small town, two clusters at different distances are formed and labeled "Nearest" and "Farthest." This approach enables us to examine the exclusive effect of distance by controlling for other confounding factors that might conceivably affect livelihood income. The results of our analysis reveal that there is a statistically paramount difference among the incomes of the closer and distant households. The more proximate households are found to significantly earn higher income than the distant ones. This finding serves as a launching pad for the next chapter, where we examine how households in distant livelihoods use different strategies to minimize transaction costs and partly compensate for the benefits lost as a result of spatial distance.

Using the findings of the second chapter as a point of departure, Chapter 3 investigates how participation in social networks makes rural households capable of reducing market transaction costs and thereby improves their livelihoods. Here, much attention is given to the idea of embeddedness of economic activities within social networks, which considers relations actors have with other actors, known as bridging (Woolcock, 2004). This is because the livelihoods of the rural people in the selected study areas are affected mainly by the transactions embedded within social networks made with more distant households from different circles. This consideration is in line with the theory of the "strength of weak ties," as portrayed by Grannoveter (1983). Thus, we argue that embeddedness in social networks forms a critical context for economic transactions, which may include transaction costs. Generally speaking, transaction costs are unique to each economic actor and it is arduous to find common ground on which to prepare a detailed list of these costs. In this chapter transaction costs stand for the costs of obtaining information about the market and other services in a small town, costs associated with visiting the small town and costs associated with accessing the economically valuable social networks found in the small town. As indicated in the previous chapter and other literature related to regional development, rural households' spatial proximity to towns plays a key role in reducing market transaction costs and improving livelihood. But, what strategy is used by distant households to minimize the effect of distance? The findings suggest that rural households' participation in social networks is used as an alternative livelihoods strategy to reduce transaction costs in situations where there are no advantages of geographical proximity. This offers an alternative livelihood strategy for rural people to improve their livelihoods and contributes to the ongoing debate on the new role of social capital.

Chapter 4 aims at estimating the effects of rural households' status on their income. It investigates for the most part the links between social status and income of rural households to give an insight into how social status is indicated and utilized as a strategy for livelihood improvement in a developing countries context. Comprehensively speaking, distinctive popular indicators have been set up for figuring out one's status in a society. These may

include occupation, education, income and wealth. Despite this, it is difficult to say that these markers truly work in rural areas of developing countries, where most people have similar socio-economic characteristics in terms of education, wealth, occupation and income. Given this gap, this chapter of the dissertation distinguishes rural households' participation in social networks as an instrument for status attainment because the empirical evidence shows that household heads' status in the study area is highly correlated with their degree of participation in social networks. This gives us a clue as to how status is viewed in the context of social capital literature and how its paybacks from an economic perspective are specified. Our findings confirm that status as indicated by degree of participation in social networks bestows some advantages on the rural households that enable them to easily regulate and influence the economic transactions that are vital for their livelihoods and thereby improve their income.

The last chapter, Chapter 5, provides general conclusions from the research findings, identifies key emerging issues, cites limitations and provides direction for future research. Areas for future research include mainstreaming of diverse pressing issues such as gender, technology adoption, innovation and knowledge transfer into the concepts of social capital and spatial distance. Overall, the findings of the three papers of the dissertation provide empirical, theoretical and methodological accounts that pave a new roadmap for further study in the ongoing rich debate about rural development.

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2 DOES SPATIAL PROXIMITY TO SMALL TOWNS MATTER FOR RURAL LIVELIHOODS? A PROPENSITY SCORE MATCHING ANALYSIS [1] [2] [3]

Abstract: The spatial dimension of rural-urban linkage has become a new subject of debate in regional development. In most empirical research the focus has usually been on the role of small urban centers in rural development. However, the effects of different particulars of the linkage such as spatial proximity to small towns on income of the hinterlands' people have been less explored. The central purpose of this paper is, hence, assessing the effect of spatial proximity to small towns on income of the people living in the surrounding rural hinterlands. It also provides a bird's-eye view of the livelihood strategies used by rural households in using town services. A Propensity Score Matching technique is employed to estimate the effects. It is apparent in the results of the study that, controlling for other confounding factors, spatial proximity to small towns has a significantly positive effect on the income of the people living in the surrounding hinterlands. This notion indirectly leads the households living in the farthest hinterlands to adopt a new coping mechanism, i.e. enhancing their social proximity in a way that compensates the opportunity lost as a result of physical distance.

Keywords: Spatial proximity; Propensity score matching; Towns; Livelihoods

JEL Classification: O18 · R12 · R29

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2.1. Introduction

Spatial proximity to small towns and their services is a crux in enhancing rural development in particular and regional development at large. The association of spatial proximity to small towns with rural development has inspired an entire policy debate on rural-urban linkage that emphasizes how the services in small towns affect the livelihoods of the rural people living in the surrounding hinterlands. Moreover, it is widely accepted in the literature that access to the services in small towns matters for the livelihoods of the people living in surrounding hinterlands.

Basically, small rural towns are considered as essential actors of the regional economic setting (Satterthwaite & Tacoli, 2003), and their definition widely varies from country to country. Many countries use different criteria in defining urban centers. In most sub-Saharan countries, including Ethiopia, small towns are often defined on the basis of administrative, demographic, and infrastructural features (Tacoli, 1998). In Tigray-Ethiopia, where this study is conducted, for the sake of administrative and management, towns are classified into three types: Small (Emerging), Town, and Metropolitan (Tigray, 1998). According to this proclamation, a small town is generally defined as a place with a population ranging from 2,000 to 20,000 people, and the economic activities of the majority of its residents are mainly service, manufacturing, and merchandising.

Small towns generally play a key role as centers of rural development in the process of regional development (Rezvani, Shakoor, Ronizi, & Roshan, 2009). Much of their activities are interconnected in many ways with their surrounding regional economies (Wandschneider, 2004). They play a catalytic role in their regional economic activities by serving as market and employment centers for the rural people. They are also considered as a means of stabilizing the population pressures of big cities, by offering different non-farm employment opportunities to the people who migrate from their surrounding rural hinterlands to the big urban centers (Satterthwaite & Tacoli, 2003).

It is important, therefore, to address the spatial dimension of rural-urban linkage from different theoretical and empirical perspectives. To do this, the study aims at measuring the effect of spatial proximity to small towns on the income of the surrounding rural people and examining how households in distant livelihoods deal with the town-related opportunities lost as result of distance. To attain this, primary data of one small town and six rural hinterlands are used. A propensity score matching (PSM) technique is applied to measure the effect. It should be noted that in the Ethiopian context there is no clear regulation for deciding upon the proximity of a rural hinterland to a small town. However, many Ethiopian government development plans revealed that if a given rural household travels for more than two hours to get health, education, market, credit, or other urban services, his village is considered as far, implying that rural hinterlands located within the boundary of two hours walking distance are considered as relatively near. This assumption is, thus, used throughout the study in identifying and categorizing the hinterlands as "farthest" and "nearest." In this light, an effort is made to explore whether the two hours cut-off distance is decisive and to see how the rural households make use of different strategies in accessing the town services.

Overall, this analysis of spatial dimension of rural-urban linkage is different from previous studies for two reasons. First, the fact that it tries to assess the secluded effect of distance from small towns on rural livelihoods by selecting an isolated small town and its surrounding rural hinterlands. Second, it gives a clue as to how households in distant livelihoods use different strategies to partially compensate for the benefits lost as result of spatial distance. We strongly believe that the results of such empirical studies will contribute to filling the literature gap observed in the spatial dimension of rural–urban linkage.

2.2. Small towns and rural development: a theoretical framework

Rural development requires strong interaction between rural and urban areas (Courtney & Errington, 2000; Dickson, 1980; Hardoy & Satterthwaite, 1988; Hinderink & Titus, 2002; Simon, 1990; Tacoli, 1998). One form of the interaction is portrayed by the role that small urban centers play in improving the livelihoods of the rural people surrounding them. In addressing this, it is imperative to understand the different particulars of the linkage observed among these two spatial units. One of the key particulars that should be critically analyzed in order to see the role of small urban centers on rural hinterlands is the spatial proximity of rural households to small towns and their services. Along with other factors, the spatial proximity to services and functions in small towns plays a catalytic role in improving rural livelihoods (Dries, Reardon, & Swinnen, 2004; Reardon & Berdegué, 2002; Weatherspoon & Reardon, 2003).

Spatial proximity, according to Balland (2012), is generally defined as "the physical distance that separates two spatial units, and can be measured by a metric system (miles or kilometers) or using travel times" (p. 6). Though it is indisputable that spatial proximity has an effect on rural livelihoods, it is not yet known what livelihoods strategies are used by households living in the relatively farthest hinterlands to use the town services. Considering this gap, therefore, it is important to empirically analyze and test how households living in the farthest hinterlands make use of different mechanisms to benefit from the town functions and services. Accordingly, a Hinterlands' Spatial Proximity Model (HSPM) is formulated in the context of rural development to better understand the extent and dimension of the effect (see Figure 2.1).

The HSPM hypothesized the spatial dimension of rural-urban linkage as a key for rural income and livelihoods. It also theorized social proximity as an alternative mechanism to be used by the farthest rural households to access town functions and services in cases where physical advantage is absent. Basically, the urban functions and services found in small

towns broadly comprise infrastructural services (financial, health, education, extension services); production and distribution of agricultural produce and services; marketing services for rural products; growth and consolidation of non-farm activities; government and administrative functions; information, technology, and innovation (Akkoyunlu, 2015; Dercon & Hoddinott, 2005; Dillon, Sharma, & Zhang, 2011; Hinderink & Titus, 2002; Satterthwaite & Tacoli, 2003; Tacoli, 1998).

It is argued that the availability of these services to rural people would enhance economic activities and thereby improve their livelihoods in various ways (Barrett, 2008). As Dillon et al. (2011) stated, competitive infrastructural services in small towns such as credit supply, advanced health, education, and extension services positively contribute to the livelihoods of the people in the rural hinterlands. Likewise, rural households could possibly benefit from the town function of producing and distributing agricultural inputs and services. These services may comprise production and distribution of farm inputs (like fertilizers, farm tools, and implements), rendering of professional services (such as lawyer services), and other basic services that are not found in the rural hinterlands (Tacoli, 1998).

Marketing activity found in the small town is also a core function that positively contributes to the livelihoods of the rural households by mobilizing the agricultural products produced by rural farmers and facilitating their purchases of consumable household goods (Dercon & Hoddinott, 2005). Access to the markets in the small town is a prerequisite to increasing rural agricultural incomes, and the spatial proximity of local small and intermediate centers to production areas is assumed to be a key factor in its potential role (Baker, 1990; Satterthwaite & Tacoli, 2003; Tacoli, 2006). Dercon and Hoddinott (2005), in their study of livelihoods, growth, and links to market towns in 15 Ethiopian villages (rural areas), noted that spatial proximity to market towns affects economic activity in rural areas. In elaborating this they argued that the closer rural hinterlands are to market towns, the more likely they are to purchase inputs or sell a variety of products.

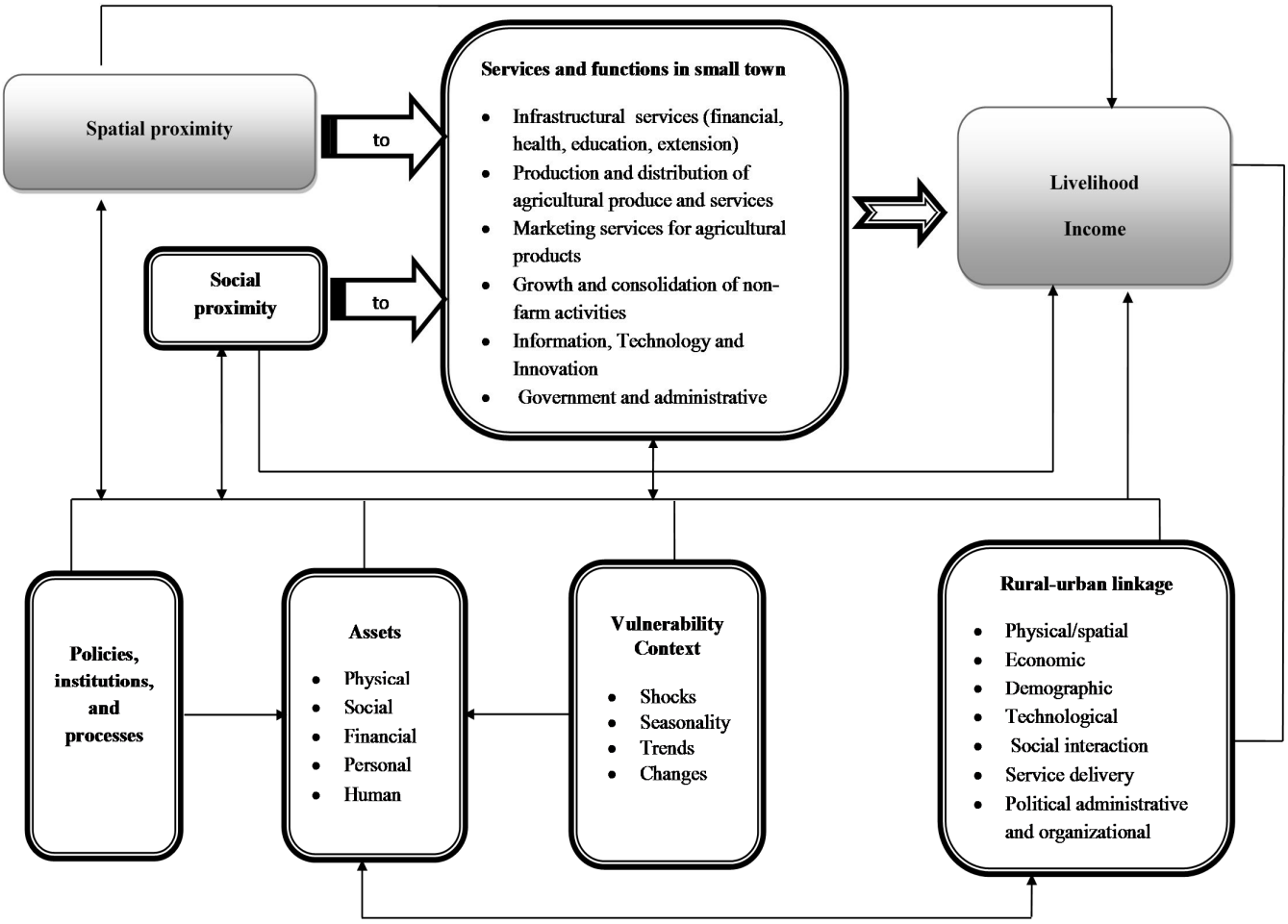
Correspondingly, the livelihood of the rural people in the hinterlands is enhanced by the administrative and government services and supports found in small towns. On the other hand, small towns contribute immensely to the improvement of the livelihoods of the rural households by acting as centers for the growth and consolidation of non-farm activities through the development of small and medium-sized enterprises (Satterthwaite & Tacoli, 2003). For instance, rural households in many developing countries tend to invest their ample time in off-farm activities found in the nearby small town (such as working as day laborers in mini construction projects) to generate additional income, which can possibly diversify their income base and ultimately improve their livelihood (Kamete, 1998). Moreover, small towns are centers for gathering market-related information and adopting different farming technologies and innovations that are important for the livelihoods of households in the rural peripheries. In a nutshell, the combined effect of these town functions can have a multiplier effect on the livelihoods of the households in the rural hinterlands.

The HSPM is, hence, a livelihoods-driven model that incorporates a clue as to what extent distance from small town matters and how the farthest households use different livelihood strategies to minimize the adverse effect of distance. On the basis of this theoretical foundation, the study attempts to answer the following research questions:

1. To what extent does spatial proximity to a small town make a difference in income among the households living in the nearest and farthest hinterlands?

2. How do households in the farthest hinterlands use different strategies in accessing the town services?

Figure 2.1: Hinterlands' Spatial Proximity Model (HSPM) - A conceptual framework for the effect of spatial proximity to small towns on income



Source: Constructed by the authors

2.3. Operational definitions of variables

Total expenditure refers to households' total sum of money expended for farm activities and household consumption purposes.

Spatial proximity to small town is the distance between the small town and the surrounding rural hinterlands measured in average walking time, stated in hours.

Age of household head is defined as the rural household head's age at the time of data collection, measured in years.

Sex of household head refers to a household head's state of being male or female.

Marital status refers to whether households are single, married, divorced, widowed, or separated.

Education refers to the educational status of the household head.

Off-farm income refers to the income generated from off-farm, including non-farm, activities in the small town.

Frequency refers to a household head's number of visits to the market in the small town.

Family contact refers to households' frequency of contact with their close family members.

Social proximity refers to households' degree of involvement and participation in social networks and common relationship focused on information exchange.

Degree of participation refers to household heads or household members' degree of participation in different organizations, associations, or social networks.

Land size refers to the total size of agricultural land owned by a household.

Irrigated land refers to a household's state of having farm land that is cultivated by supplying water using pipes, sprinklers, ditches, or streams.

Livestock ownership refers to the total number of livestock possessed by a household.

Credit refers to households' ability to access credit services during the year.

Exposure to multimedia refers to households' access to television, radio, telephone, and Internet services.

Access to market information refers to households' ability to obtain information about markets.

2.4. Measurement attribute of the outcome variable and its rationale

To achieve the objectives of the study, both dependent and independent variables are identified and measured. As the theoretical framework indicates, the livelihoods outcome "households heads' income" is the outcome variable. It is measured through the expenditure approach instead of the income approach. The income approach is rejected for two reasons. First, experience reveals that asking respondents their income is quite a sensitive approach, which eventually makes them reluctant to tell the exact amount they actually earn. Second, this approach assumes a household only has one income earner, whereas in many cases several family members contribute to the household income, and often to differing degrees. In other words, the expenditure approach gives a clearer picture of the disposable income available to the household as a whole.

(For the measurement attributes of the treatment and independent variables see Table 2.2)

2.5. Materials and methods

2.5.1. Selection and description of the study areas

The study was conducted in the Degua Tembien district of the Tigray regional state of the Federal Democratic Republic of Ethiopia. One small town, namely Hagereselam, and six rural hinterlands, namely Micheal Abiye, Selam, Limeat, Amanit, Mizan Berhan, and Endaselassei were selected as study areas. On the basis of data obtained from the Degua Tembien District Finance and Economic Development Office (2012) and the Ethiopian Central Statistical

Agency (2007), the population of Hagereselam town in July 2012 was estimated to be about 9,212, and almost all the people living in the surrounding hinterlands lead agricultural-based livelihoods. Essentially the small town was selected using purposive sampling. This was done mainly because the small town is not located on a highway, where other big cities and urban centers are found. This means it is easier to isolate the effect of the town on the income of the people in the rural hinterlands, so that the impact of other urban centers can be minimized. In selecting the six rural hinterlands, a cluster random sampling technique was used. To this end, on the basis of the treatment factor of average walking time spent to reach the selected small town, two clusters at different distances were formed: the first within a radius of an average of 2 hours walking time distance from the small town ("Nearest cluster") and the second at 2-6 hours walking distance ("Farthest cluster"). From each cluster, a total of three hinterlands were selected randomly. The main reasons for using the aforementioned average walking times as a basis for cluster sampling were:

- First, in Ethiopian rural areas it is traditionally believed that the average walking time that is considered as "near" is 2 hours walking distance.

- Second, in many Ethiopian government development plans and reports it is stated that if a rural household travels for more than two hours to get health, education, market, credit, or other urban services, its village is considered as a remote/ far area.

- Moreover, it is stated that the maximum walking time for the "farthest" cluster is set as 6 hours. This is done because the geo-referenced data of Ethiopian towns and rural hinterlands show that as a given rural hinterland gets farther away for more than an average of 27 km (to the nearest an average of 6 hours walking time) from one town, it becomes more likely that this hinterland would be closer to another

town, and as a result, isolating the impact of the selected town on the selected hinterlands would be difficult.

Overall at this point in time, the abovementioned three hinterlands from the "nearest" cluster, namely Micheal Abiye, Selam, and Limeat, and three from the "farthest" cluster, namely Amanit, Mizan Berhan, and Endaselassei, are selected as sample study areas. For a detailed description of the study areas see Table 2.1, Figure 2.2, and 2.3.

Table 2.1: Demographic data of the study hinterlands

Study hinterlands	Total population			Number of households			Clusters
	Male	Female	Total	Male Headed	Female Headed	Total	
Micheal Abiye	2854	2635	5489	995	252	1247	Nearest
Limeat	2444	2723	5167	952	232	1184	
Selam	1958	1756	3714	678	166	844	
Amanit	1559	1641	1641	684	143	827	Farthest
Mizan Berhan	2077	2069	4146	791	151	942	
Endaselassei	1732	1643	3375	462	327	789	
Grand total	12624	12467	23532	4562	1271	5833	

Source: Degua Tembien District Finance and Economic Development Office, 2012

What is striking about the data in Table 2.1 on the gender of heads of rural households is the high number of female-headed households. The phenomenon of women outnumbering men in towns has been documented for Ethiopia and can be summed up as rural women migrating to town to find economic opportunities there. However, the data in Table 2.1 clearly shows a

high number of rural female householders. Overall, nearly 22% of all rural households in the six *tabias* are headed by women. In one *tabia* (Enda Sellasie), an astounding 41.4% of households are headed by women. What these data suggest is that these women may have security of agricultural land through the program of land certification that guarantees the rights of women to land. It could also indicate that these *tabias* are also able to provide women employment in a range of informal activities particularly related to the large service and bar sector (mirroring the urban situation), because these *tabias* are important trade and marketing centers that typically provide employment for women. This paper did not explore more thoroughly these aspects because it is a bit outside of the scope of its objectives.

Figure 2.2: Administrative map of the study area by region[i] and district

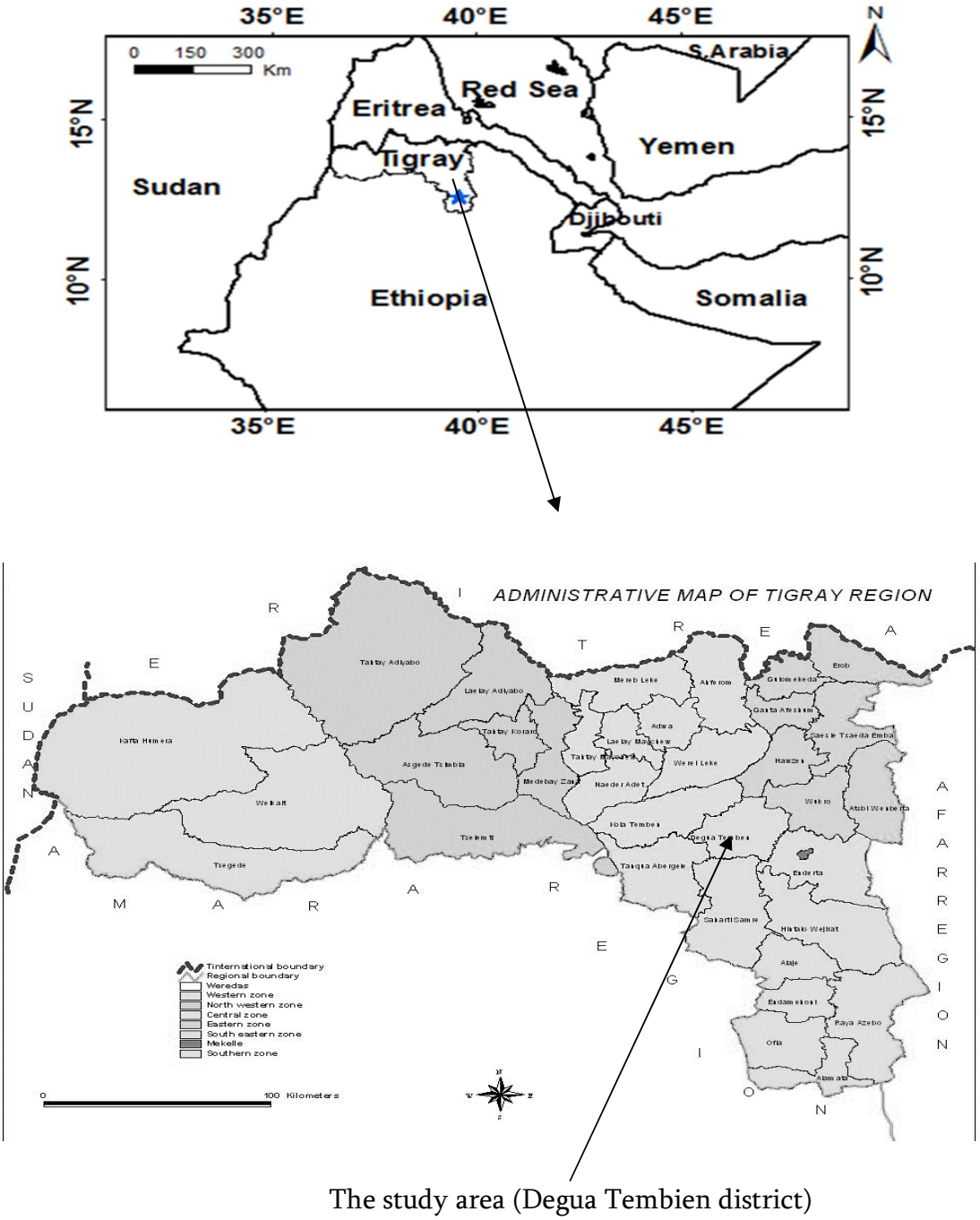
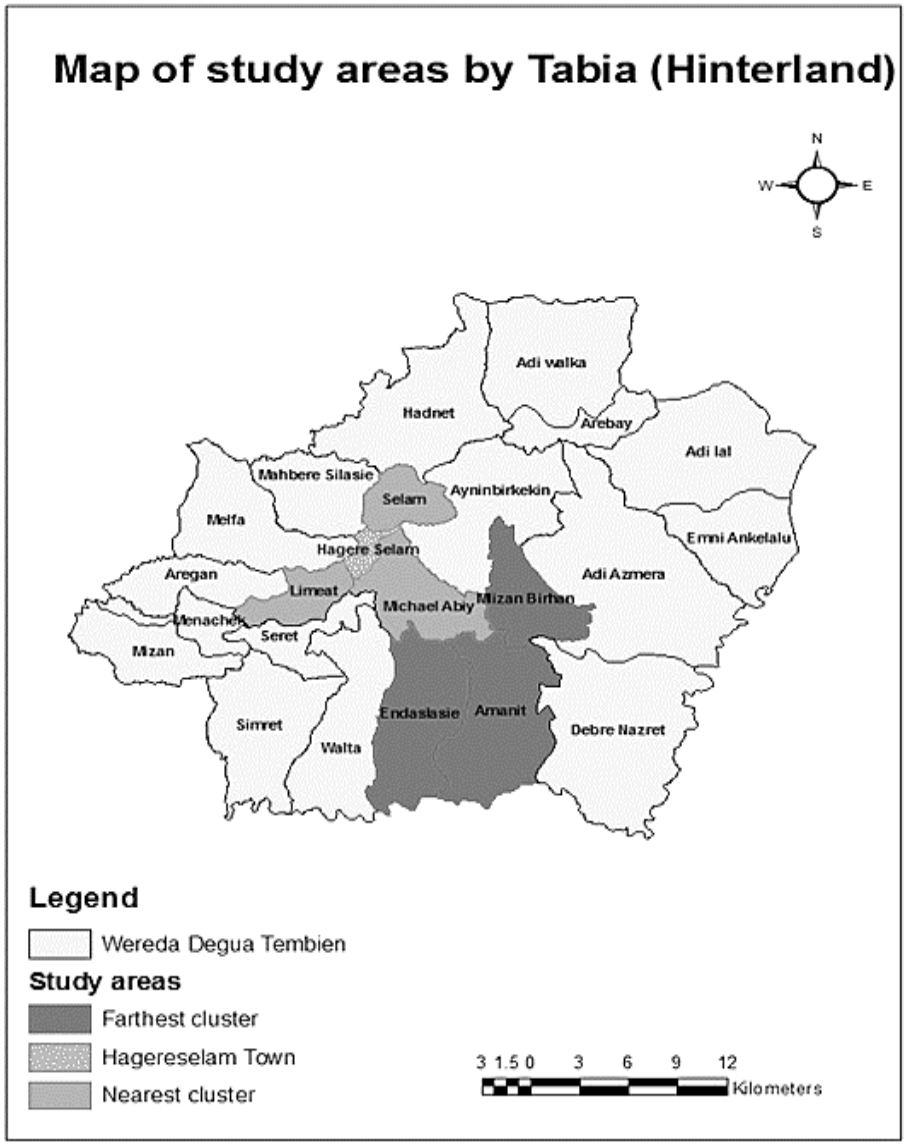


Figure 2.3: Degua Tembien district/ Wereda[ii] and the study hinterlands/ Tabias[iii]



Source: The Central Statistical Agency of Ethiopia

2.5.2. Survey design and model specification

2.5.2.1. Survey design and estimation method

The main objective of the study is to estimate the effect of rural households' spatial proximity to small towns on their income. A logical assessment of such an effect demands the analysis of the household groups near to small towns (the treatment group) as compared to those far from small towns (the comparison group). Compared to other models such as the Ordinary Least Squares (OLS) model, the Propensity Score Matching (PSM) method is an appropriate non-experimental technique to estimate such causal treatment effects (Caliendo & Kopeinig, 2008). The Propensity Score Matching method, according to Heinrich, Maffioli, & Vazquez (2010), is explained as

> "the probability that a unit in the combined sample of treated and untreated units receives the treatment, given a set of observed variables. If all information relevant to participation and outcomes is observable to the researcher, the propensity score (or probability of participation) will produce valid matches for estimating the impact of an intervention. Therefore, rather than attempting to match on all values of the variables, cases can be compared on the basis of propensity scores alone" (p.4).

Basically, there are advantages in using propensity scores over OLS. Unlike OLS, which runs estimations based on full sample data, the propensity score matching does estimations only based on matched observations. Consequently, this potentially reduces estimation bias, and estimators are generally more robust to model misspecifications. This is particularly important in our setting where samples are classified as "treatment" and "control" groups.

Moreover, in the propensity score matching one looks for two sets of control variables, the predictors of participation and predictors of outcome; in contrast, the OLS focuses only on variables determining the outcome that are also exogenous (Saunders & Steffen, 2011). Due to these and other reasons, we found it imperative to employ the propensity score matching in our case.

In advancing the concept of PSM, Rosenbaum and Rubin (1983) initially developed a statistical matching using the propensity score, the estimated probability that a household receives the treatment (e.g. being nearest to small towns) to make comparisons with those without treatment (e.g. being far from the small town). Then it was easier to identify the effect of a treatment, which was estimated as mean change in the outcomes for each treatment household from a weighted mean of outcomes in each similar comparison group of households (Ahmed, Rabbani, Sulaiman, & Das, 2009).

Due to its diverse nature, the application of PSM these days is becoming popular in various fields of studies. It is often applied in situations where one is confronted with a group of treated units and a group of non-treated units, no matter how the type of treatment is different (Caliendo & Kopeinig, 2008). As a result of this, a myriad of empirical studies have been produced through the application of PSM. For instance, Trujillo, Portillo, and Vernon (2005) applied the concept of PSM in assessing the impact of health insurance on medical care participation; Heckman, Ichimura and Todd (1998), and Smith and Todd (2005) used it to analyze the impact of training programs on income; Ham, Li, and Reagan (2003) applied the concept of PSM to assess the impact of internal migration on real wage growth. Notwithstanding the aforementioned literatures, little emphasis has been given to the applicability of PSM in regional development issues, where its outcome is crucial.

The aim of this study is, hence, to assess the extent to which spatial proximity to small towns affects the livelihoods of the surrounding rural people by applying the method of PSM. To this end, the following methodological steps were adopted:

i. First, the study hinterlands were classified according to the treatment factor of average walking time, as "Nearest cluster" (treatment group) and "Farthest cluster" (comparison group).

ii. Then, an econometric model was developed to estimate the propensity scores of the effect of spatial proximity to small towns on rural households' income using a logit model. In doing so, following the notation of Heckman, Ichimura, and Todd (1998) and Smith and Todd (2005), $D = 1$ if a unit of household is in the nearest cluster and D = 0 otherwise. Then the outcome for the nearest households (D =1) and the farthest households (D =0) will be defined as Y_1 and Y_0 respectively. Then an estimate of the average effect of spatial proximity to a small town on those nearest households - the average effect of the treatment on the treated (ATT) will be constructed as follows:

$$ATT = E(\Delta / X^*, D=1) = E(Y_1 - Yo / X^*, D=1) = E(Y_1/X^*, D=1) - E(Yo/X^*, D=1) \quad \text{.....Equation (1)}$$

X^* above is a vector of control variables (the explanatory variables that should be controlled). The first set on the right-hand side of equation 1 is observed. However, the second set on the right-hand side, i.e. $E(Yo/X^*, D=1)$, is not observed. Due to this reason it is easier to estimate the effect of spatial proximity to small towns on the rural livelihoods using PSM as a method for estimating the counterfactual outcome for households in the nearest cluster (Rosenbaum & Rubin, 1983). Let $P(X^*) = Pr(D=1/X^*)$ be the probability of being in the nearest cluster conditional of X^*. By matching the observations of households in the nearest cluster to observations of households in the farthest cluster with similar values of P(X), PSM thus develops a statistical comparison group. To this end, Rosenbaum and Rubin (1983) and

Heckman and Robb (1985) reveal that the approach bases itself on the following two assumptions:

- *Selection of observables. A*ssumes that after controlling of X^*set of observable covariates, the outcome will be independent of the treatment status.

$$(Yo,\ Y_1) \perp D \mid X^* \text{.....Equation (2)}$$

This is a simple assumption stating that the treatment on the basis of the variable spatial proximity to a small town will be as good as random after controlling for X^*covariates (Heinrich et al., 2010).

- *Common support condition.* Dictates that for each value of X^*covariates, the probability of being both treated and untreated is positive. In other words, the probability of being in the nearest cluster and the farthest cluster must always exceed zero for every possible value of X^*.

$$0 < P\ (D = 1 \mid X^*) < 1 \text{.....Equation (3)}$$

Note: According the rule of probability, if the probability of being treated for each level of X* falls between 0 and 1, the probability of not being treated lies between the same values.

If these two assumptions are satisfied, the estimation using the PSM is considered as strong and unbiased.

iii. After the propensity scores are estimated, a matched sample was formed in order to estimate the treatment effects on the treated by directly comparing the outcomes of

treated and untreated households in the matched sample. To this end, the four commonly known matching algorithms – nearest neighbor matching, radius matching, kernel matching, and stratification matching – were considered, and their related standard errors were estimated by bootstrap for each estimate. It should be noted that the aforesaid four matching methods arrive at different points on the boundary of the trade-off between quality and quantity of the matches, and none of them is *a priori* superior to the others. Their joint application, however, paves the way to examining the robustness of the estimates (Becker & Ichino, 2002).To this end, the study reported the results using Kernel matching and provide a footnote on the sensitivity using the other matching algorithms.

2.5.2.2. Sampling

Using the roster of the farmers' association of each sample rural hinterland as a sampling frame, a total of 260 sample households, 114 of which were from the nearest hinterlands and the other 146 from the farthest hinterlands, were selected purposely as sample respondents. Within each cluster of hinterlands households were selected using Probability Proportionate to Size (PPS) technique. Giving a larger quota to the latter group enables the households in the nearest hinterlands to get one or more matching households from the farthest group. Concurrently, to select those sample household, accentuation might have been likewise given for their degree of participation in social networks. Thus those samples drawn included both household heads having active and not active participation in social networks.

2.5.2.3. Data, data source, and data collection

As stated in the aforementioned paragraphs, the study aims at determining the extent to which spatial proximity to small towns affects the income of the surrounding rural people. To achieve this objective, hence, both qualitative and quantitative data from both primary and secondary sources were collected and used. The study is based on the cross-sectional data set for sample household units taken in 2014.

The primary data was collected using a structured questionnaire survey and focus group discussions. The major aim of the questionnaire survey was to extract profound and detailed qualitative and quantitative household-level data. Prior to the development of the final version of the questionnaire, a checklist of questions related to the research questions was prepared, and informal interviews with selected household respondents were conducted. Subsequently, before the commencement of the actual data collection process, a draft questionnaire was designed and pre-tested on randomly selected households. Then, after the completion of the pre-test phase, a formal questionnaire was designed that dropped redundant questions and added new ones. Finally, the data collection process was done by appointing experienced data collectors who have ample experience on similar research projects. Moreover, a focus group of 12 rural households composed of two households from each of the six study hinterlands was formed, and accordingly information was extracted to triangulate and clarify some key results identified through the quantitative analysis.

The primary data is supplemented by secondary sources. To this end, documents from different governmental and nongovernmental institutions and reports of other relevant international organizations were consulted. More importantly, the latest Welfare Monitoring

Survey (WMS) data set collected and issued by the Ethiopian Central Statistical Authority (CSA) was consulted for further information.

2.5.2.4. Data analysis

The data collected through questionnaire surveys was analyzed qualitatively and quantitatively through descriptive statistical analysis and advanced econometric analysis. The descriptive statistical analysis was used to examine the socioeconomic and demographic conditions of the sample rural households. To this end, simple ratio, percentages, averages, and figures are used. In conjunction with the descriptive statistical analysis, the Propensity Score Matching method (PSM), which better explains the analysis for the effect of spatial proximity to small towns on the income of the rural people in the hinterlands, was employed. The quantitative analysis was executed by running an advanced econometric analysis package, STATA.14.

2.6. Results and discussion

2.6.1. Summary of the descriptive statistics

Table 2.2: Summary of the descriptive statistics

Variable names	Measurement attributes	Symbols	Valid N	Mean	SD	Min	Max
Outcome variable:							
Livelihood income	Log of total household expenditure in Ethiopian birr (ETB) per year	*Income*	260	9.06	.47	7.9	10.77
Treatment Variable:							
Households' spatial proximity to small town	1 if nearest cluster, 0 if farthest cluster	*proxTown*	260	.43	.49	0	1
Other independent variables:							
Age of household head	Continuous variable in number of years	*age*	260	53.51	8.07	40	80
Sex of household head	1 if female, 0 otherwise	*sex*	260	.12	.33	0	1
Marital status of household head	1 if the respondent is married, 0 otherwise	*maritalStatus*	260	.88	.32	0	1
Education of household head	1 if literate, 0 otherwise	*education*	260	.02	.16	0	1
Off-farm income	Amount in ETB per year	*off farmIncome*	260	491.69	551.45	0	2500
Frequency	Number of visits to the market in the small town per month	*frequency*	260	1.42	.73	1	4

Family contact	1=Everyday, 2=5-6 times a week, 3=3-4 times a week, 4=Once or twice a week, 5= Once or twice a month, 6=3-4 times a year, 7=Once or twice a year, 8=Less often	*familyContact*	260	3.76	.99	2	5
Degree of participation in social networks	1=Not active, 2= Somewhat active, 3=Very active, 4=Leader	*degreeParticipation*	260	2.20	.85	1	4
Land size	Total land size measured in acres	*landSize*	260	.46	.42	.125	2
Irrigated land	1 if yes, 0 if no	*irrigatedLand*	260	.20	.40	0	1
Livestock ownership	The number of livestock in Tropical livestock units (TLU)	*livestock*	260	3.56	.93	1.12	7.16
Credit	1 if yes, 0 if no	*credit*	260	.65	.47	0	1
Exposure to multimedia	1 if yes, 0 if no	*MultiMedia*	260	.66	.47	0	1
Access to market information	1=Quite difficult, 2=Difficult, 3=Neither, 4=Easy, 5=Quite easy	*marketInformation*	260	1.46	.57	1	3

2.6.2. General approach

In applying PSM, the study initially identified and used different demographic, hinterland-related, welfare and asset possession variables (For details see Table 2.2). After these envisaged variables were pointed out, the logits for spatial proximity to a small town were estimated and the balancing properties of the propensity scores were checked. Accordingly the specifications used in the study were found to be complete and robust ones that satisfied the balancing tests. Moreover, the "common support" option has been selected to assure whether matches are computed only where the distribution of the density of the propensity scores overlaps between treatment and comparison observations. On the common support sample, the logit model was estimated again to get a new value of propensity scores to be applied in the matching process. Finally, the treatment and comparison observations were matched by using the chosen matching algorithm, i.e. kernel matching. To this end a STATA command pscore and a standard error boostrap for each estimate were used.

2.6.3. Propensity score estimates

Table 2.3 reports the logit estimates for the selected model of the propensity score for spatial proximity to a small town. In doing so, the treatment variable is put first (that should be the dummy variable for whether or not it receives the treatment), and then the aforementioned independent variables are listed. Accordingly, the results obtained based on the logit regression model are presented in Table 2.3.

Table 2.3: Estimation of the propensity scores

Households' spatial proximity to small town	**Freq.**	**Percent**	**Cum.**
Farthest cluster	146	56.15	56.15
Nearest cluster	114	43.85	100.00
Total	260	100.00	
	Coef.	**Z**	**P>|z|**
Age of household head	-.0098425	-0.31	0.75
Marital status of household head	-1.473263	-2.02	0.04 **
Education of household head	1.681022	1.31	0.19
Off-farm income	.0022183	4.36	0.00***
Frequency	1.54592	3.68	0.00***
Family contact	.3633349	1.50	0.13
Degree of participation	-1.048912	-3.88	0.00***
Land size	.2783222	0.53	0.59
Irrigated land	3.083637	4.78	0.00***
Credit	.274434	0.59	0.55
Exposure to multimedia	1.696297	3.10	0.00***
Access to market information	2.20104	4.71	0.00***
Livestock ownership	-.1631027	-0.71	0.47
Constant	-5.628255	-2.69	0.00
Number of observations	260		
Prob > chi2	0.00		
PseudoR2	0. 59		

The dependent variable "Spatial proximity to small town" is represented by 1 for "Nearest" cluster and 0 for "Farthest" cluster.

*** p<0.01, ** p<0.05, * p<0.1

From the first output in Table 2.3 it is observed that there are a total of 260 observations, with 43.85 percent of these households in the nearest cluster and the remaining 56.15 percent in the farthest cluster. As mentioned in the previous paragraphs, the independent variables would be matched and the outcome variable, i.e. *Income*, would be analyzed in a way that compares the effect if households participate in the treatment, i.e. being in the nearest cluster.

Focusing on the significant variables, the logit estimates for spatial proximity revealed that the corresponding p-values of the variables household heads' off-farm income, frequency of visiting the market, exposure to multimedia, and access to market information were found to be significant at a 1% probability level and to have positive coefficients, inferring that household heads living in the nearest cluster are more likely to have a significantly higher off-farm income, frequency of visits to the market in the small town, better multimedia exposure, and better access to market information than those in the farthest cluster. Moreover, it should be noted that households in the nearest cluster are more likely to have irrigated land compared to those who are in the farthest cluster.

Continuing to focus on the significant variables, marital status has an adverse and statistically significant effect on spatial proximity, implying that married household heads are less likely to be found in the nearest cluster than in the farthest one. Likewise, the corresponding p-value of the variable household heads' degree of participation in social networks shows that it is statistically significant at a 1% probability level with a negative logit coefficient, indicating that households living in the nearest cluster are less likely to vigorously participate in different local networks than those in the farthest cluster. In contrast, households living in the farthest hinterlands have relatively strong participation in different social networks that are crucial for their livelihoods. It is important to underscore here that the extent of social proximity is indicated by households' degree of participation in different social networks. Similar studies also used participation in social networks as an indicator for social capital. For instance, Beugelsdijk and Van Schaik (2005) in their empirical work on social capital and growth in Europe used involvement in social networks as an indicator for social capital. Their finding suggests that it is not the meager existence of social networks that enhance regional economic growth, but active participation in these relationships.

Overall, the aforementioned findings infer that the households living in the nearest and farthest hinterlands draw on different livelihood strategies to benefit from the town services. In this light, instead of opting to participate in different social networks, those households in the nearest hinterlands adhere to the strategy of frequent visits to the small town to benefit from the town services. This enables them to directly engage with service providers to do business transactions and collect information that is crucial for their livelihoods. Conversely, the households living in the farthest hinterlands use a different livelihood strategy, i.e. strengthening their degree of participation in different social networks to benefit from the town services. But how do these rural people benefit from the town services and partly compensate the opportunity lost due to distance?

Basically rural households who live in the farthest hinterlands are characterized by having less access to town functions. In elaborating this, the results of the focus group discussion revealed that the rural households often participate in different formal and informal social networks. These include farmers associations, cooperative associations, women's associations, informal credit associations, and informal local gatherings organized for the purpose of monthly religious memorials of saints. According to the replies given by the household heads, participating in these types of networks is crucial for their livelihoods because these networks are critical sources of information related to market, credit, aid, and new government legislation. On top of this, they noted that the informal local gatherings organized for the purpose of monthly religious memorials of saints are the most crucial social networks for their livelihoods. A majority of them reported that participating in these types of events would enable them to obtain key information about the market, new government interventions, and other activities that in turn have a significant impact on their livelihoods. Due to this reason, they make considerable efforts to exploit the economic benefits embedded within social networks and minimize the adverse effect of distance by participating in local social networks. These findings suggest that the households living in the nearest and farthest hinterlands draw on different livelihood strategies to benefit from

the town services. This could be a key finding that possibly gives a new insight into the livelihoods strategy in the spatial dimension of the rural-urban debate.

Finally, for the households in the nearest cluster, household heads' age, education, family contact, size of owned land, access to credit, and livestock ownership were not found to be significant in affecting the variable spatial proximity to small towns.

2.6.4. The common support and balancing property

It is apparent in the results of Table 2.4 that the region of the common support of the propensity scores is enforced and formed within the interval of [.016, .999], implying that there are no propensity scores that go higher or lower than .999 and .016, respectively.

Moreover, for the given case an optimal six numbers of blocks are used, which ensures that the mean propensity score is not different for treated and controls in each block. Thereafter, a test for the balancing property of the propensity score is done for all covariates and blocks considered in the logit model. Accordingly, the output in Table 2.4 assures that the balancing property is sufficiently satisfied, implying that in each of the blocks, not only are the propensity scores similar but the independent variables that are going to be matched are also similar. These findings assure that the choice of covariates and the output of the propensity score matching are compelling.

Table 2.4: Estimation of the common support region, blocks and balancing property

Common support region	Minimum	Maximum	Observations	Number of blocks
	.016	.999	216	6
Balancing property: Satisfied for all variables and blocks				
Inferior of block of pscore	Spatial proximity to a small town			Total
	Farthest cluster	Nearest cluster		
.0161036	68	3		71
.2	14	9		23
.4	12	11		23
.6	5	4		9
.7	0	7		7
.8	3	80		83
Total	**102**	**114**		**216**

2.6.5. Estimates of the matching estimators

To check whether spatial proximity to a small town (i.e. 2 hours cut-off distance from the small town) makes a significant difference among the total expenditure of the selected households, the four matching techniques were considered as estimators. In this part, only the estimations based on Kernel matching are presented. The estimations based on the other matching techniques are footnoted for sensitivity[4]. It should be noted that all the results used bootstrapped standard errors and the focus is mainly on the average treatment effect on the treated (ATT) and the corresponding t-values.

[4] To examine the robustness of the estimates, estimations were done based on the rest of the matching algorithms – Nearest neighbor matching (Heinrich et al. 2010), Radius matching (Dehejia and Wahba 2002), and Stratification matching (Caliendo and Kopeinig 2008). The results revealed that the corresponding t-values based on the aforementioned algorithms were 3.775, 8.407, and 11.975, respectively implying that being close to the small town made the closer households significantly better off than the households in the farthest hinterlands. These findings are similar to the results of the Kernel matching, as their t-values are greater than 1.96.

2.6.5.1. Estimates of kernel matching

Kernel matching is a non-parametric matching estimator that assumes that all treated are matched, with a weighted average of all controls having weights that are inversely proportional to the distance between the propensity scores of treated and controls (Smith & Todd, 2005). Kernel matching is advantageous in that it has a lower variance, as it uses all the observations in the comparison group inside the common support. Considering this, the results in Table 2.5 show that the ATT, which is the difference between the outcome variable (i.e. total expenditure) of the households in the nearest cluster and farthest cluster after matching is 0.59, and the t-value (i.e. the significance level) is 3.798.

Table 2.5: ATT estimation with the kernel matching method

Number of treated	Number of control	ATT	Standard error	t-value
114	146	0.590	0.155	3.798

These indicate that the difference between the total expenditure of the nearest and farthest households is significant as its t-value is greater than 1.96. What do these results imply? As mentioned in the outset, small towns constitute important market outlets and centers for consolidating off-farm activities for rural people (Satterthwaite & Tacoli, 2003). Not surprisingly, the closer the rural households are to small towns the better access to town functions they will have. This in turn has a positive effect on their income and eventually improves their livelihoods. Even with limited transportation means, household heads living in closer hinterlands to small towns can have a tendency to easily walk and visit the town and perform economic activities (market, employment, and other services) in a way that improves their livelihoods. The implication for this is that the closer a rural hinterland is to

a town the more frequently the households in it will visit the market in the town so that they can get an opportunity to sell their produce, to purchase consumer goods, to acquire farm inputs, and to engage in off-farm works and thereby improve their livelihoods. These findings are similar to Gaile and Ngau (1996), who compared and contrasted isolated farm household economies with farm households, which have better access to market center in Kenya. The results accentuated significant differences in agricultural production, frequency of market visits, and income among rural households with and without access to towns in Kenya. Kenyan rural households closer to small urban centers were found to farm a greater percentage of their available acreage and generate higher income per cultivated land than those farthest households with limited access to market towns (Gaile & Ngau, 1996).

2.7. Conclusions

Small towns are considered as crucial actors in the regional economic setting. Some of the key factors that need emphasis in addressing this issue are the rural households' spatial and social proximities to services in small towns. Understanding these dimensions from the theoretical and empirical points of view and analyzing their effect on the rural households' income is a key to enhancing regional development issues. A logical assessment of such an effect demands the use of well-developed empirical models and data. To this end, the study used a cross-sectional data set for sample household units taken in 2014. A propensity score matching was used to analyze the data. It is apparent in the results of the study that the effect of spatial proximity to a small town significantly boosts the yearly total expenditure, which is a proxy for income. This implies that households who are within the 2 hours cut-off distance from the small town (i.e. households in the nearest hinterlands) have a significantly higher expenditure than those who are in the farthest hinterlands, indicating that spatial proximity to a small town is imperative in fostering the rural income base as it simplifies the rural households' ability of using the town services. Most importantly, this notion indirectly leads the households in the farthest hinterlands to develop alternative livelihood strategies for using the town services, i.e. enhancing their social proximity in a

way that compensates for the opportunity lost as a result of physical distance. Overall, while the findings underscored that spatial proximity to a town plays a key role in improving rural livelihoods, there would be greater paybacks from participating in social networks as a livelihoods strategy by rural households, who live in relatively farthest hinterlands. This could be a key finding that answers the research questions put forth at the outset and possibly provides a new road map for further research on the rural-urban debate.

2.8. Notes

i. A region is an ethnic-based administrative territoriality of Ethiopia that is larger than a hinterland or a district.
ii. Wereda refers to an administrative unit of Ethiopia larger than a tabia, similar to district.
iii. Tabia is the smallest administrative unit of Ethiopia, similar to a ward or hinterland.

2.9. References

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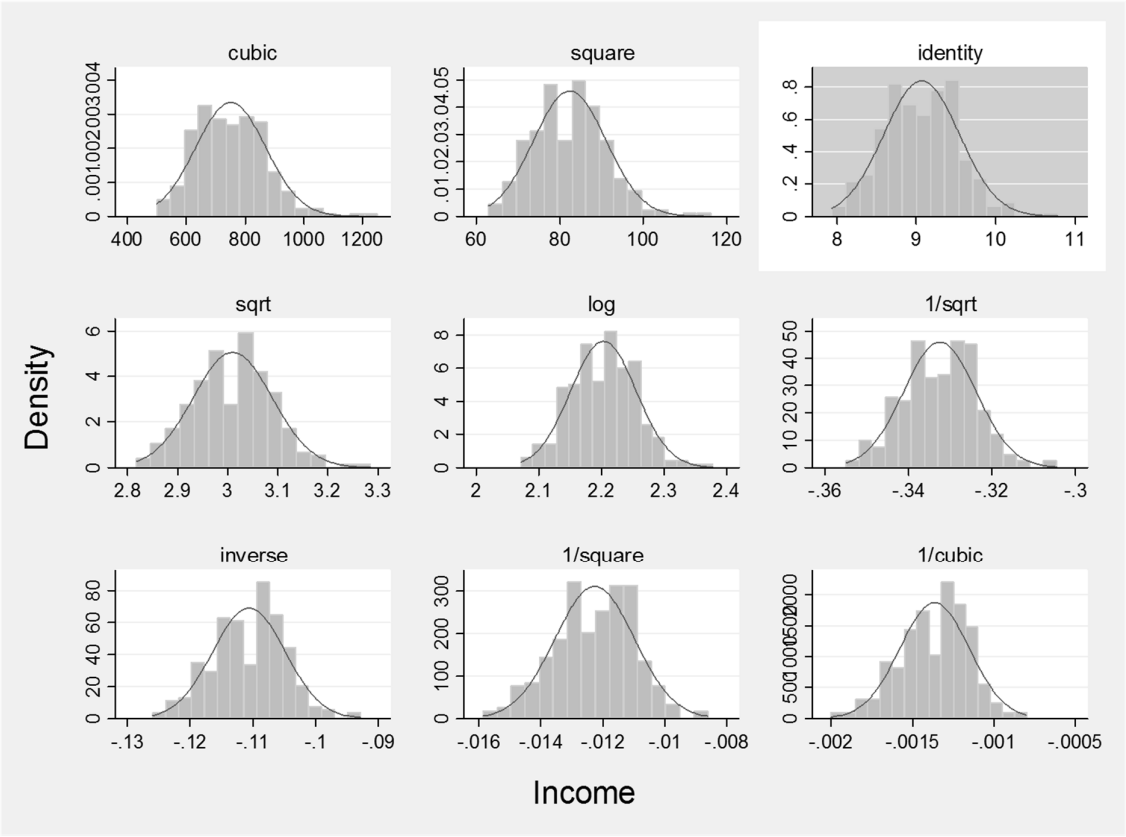
2.10. Appendix

2.10.1. Distribution and normality density plot of the dependent variable 'Income'

Figure 2.4: Distribution and normality density plot



2.10.2. Tropical Livestock Unit (TLU) equivalent conversion factors

Table 2.6: TLU equivalent conversion factors

Livestock type	Conversion factor
Cow	0.7
Oxen	0.7
Sheep	0.1
Goat	0.1
Donkey	0.5
Mule	0.8
Horse	0.8
Beehives	0.5
Poultry	0.01
Pigs	0.2

Source: Jahnke (1982); FAO (1987)

3 SOCIAL CAPITAL, TRANSACTION COSTS AND GEOGRAPHICAL DISTANCE: AN EMPIRICAL ANALYSIS OF SOCIAL NETWORKS [5] [6]

Abstract: This paper uses spatial economic data from the northern part of Ethiopia to investigate the cost minimising capacity of social capital, which is underexplored from a spatial perspective. Following the identification of the domains of transaction costs that could be minimised, a propensity score matching technique is applied to estimate the effects of rural households' participation in social networks in minimising transaction costs. While framing the analysis from the perspective of rural households' spatial proximity to a town, the paper hypothesised active participation in social networks as a mechanism for reducing transaction costs. It is evident from the results that households' active participation in social networks is shown to be a central factor in minimising the transaction costs incurred by rural households who live in relatively far hinterlands. This confers an alternative option for rural people to improve their livelihoods in cases where there are no advantages of geographical proximity to towns.

Key words: Social capital; propensity score matching; Ethiopia; geographical distance; towns; transaction costs

JEL Classification: O12 · R12 · Z13

[5] This paper is co-authored with Dr. Roel Rutten and Professor Paul De. Graaf and it is already submitted to the *World Bank Research Observer* journal.

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3.1. Introduction

Analysis of social capital is suggested as a tool for creating a link between sociological and economical models. Though the proper definition of social capital has remained a source of haziness itself, a myriad of studies have tried to address social capital from different perspectives. In a broad sense, social capital refers to the social interactions among actors made with the intention of getting prolific outcomes (Putnam, 1995; Rosenbaum & Rubin, 1983; Szreter, 2000). The relationships between social capital and other factors such as transaction costs and households' livelihoods are context and resource specific. The empirical evidence to demonstrate their linkage has also been limited. On top of this, it is apparent in the literature that social capital is constructed with various aims, depending on the key actors and their interests. One of the core aims of strengthening social networks is an economic motive. Though the effects of social capital in the economic sense have been frequently discussed in the literature (Putnam, 1995; Putnam, Feldstein, & Cohen, 2004; Westlund & Adam, 2010), previous studies have simply looked into the nature of social networks (Malecki, 2012) without addressing the spatial debate of the relation in an economic sense. Considering this gap, addressing the role of social capital from an economic perspective and examining its effect on livelihoods is compelling. Hence, the paper aims to estimate the effect of households' participation in social networks on reducing transaction costs in a way that improves their livelihoods. To this end, first, six rural hinterlands and one small town were selected as study areas. Second, based on a criterion of two hours cut-off distance from the small town, the six hinterlands were equally categorised into two groups labelled 'farthest' and 'nearest'. This is done mainly due to the fact that a myriad of Ethiopian government development plans and different development related documents instigated by non-governmental organisations consider a hinterland as 'far/remote' if its dwellers walk on average for more than two hours to get advanced health, education, market, credit or other urban services. Third, an effort was made to collect information from sample respondents on how the rural people generate income for their livelihoods and reduce their market transaction costs through strengthening their participation in social

networks. From the data gathered, we identified the domains of potential transaction costs that could be minimised as a result of using social networks. Moreover, additional data were collected from selected focus group discussants to bestow an empirical background on the study areas. Finally, estimation was done using the selected advanced econometric model – the Propensity Score Matching technique (PSM) – to measure the effect.

Overall, the paper seeks to develop a more effective set of targeted theoretical recommendations for strategies involving the use of social capital to reduce transaction costs. Accordingly, emphasis is given to seeing how rural households living in the relatively farthest hinterlands are able to reduce their market transaction costs through strengthening their participation in social networks, as well as clearly measuring the extent to which social networks partly compensate for the benefits lost as a result of geographical distance. This approach could be different in that it attempts to measure the cost minimising capacity of social capital, which has been less surveyed from a spatial perspective.

3.2. Research questions

The paper attempts to answer the following research questions:

i. What is the social capital of rural livelihoods?
ii. How does social capital help to generate income for rural people?
iii. To what extent does social capital minimise market transaction costs?
iv. How does social capital compensate for opportunities lost as a result of geographical distance?

3.3. Background information: stories from households

In order to properly address the aim of the study it is imperative to initially see the background information on what social capital in the selected study hinterlands looks like

and how it is linked to the livelihoods of the rural people. For that reason this part presents the background information accompanied by some stories from the households. To collect this information, first a set of carefully designed questions was prepared. Then a focus group of 12 rural households composed of two households from each of the six study hinterlands was formed. In doing so, some selection criteria such as gender, age and other demographic factors were taken into consideration. The function of the focus group discussion was primarily to supply empirical background information on the household heads in the selected study areas and to clarify some points about the quantitative analysis. Predominantly, the details of the information collected from these focus group discussants are recapitulated in this section. All in all, this enabled us to have a general picture of the particulars related to social capital in the study sites.

3.3.1. Income related

The information gathered from the focus group discussants revealed that besides farming (both regular and irrigation), livestock production, soil and water conservation works, off-farm works and petty trade are the major sources of income for the rural households. The rural households mainly generate income for their livelihoods from farming and farming related activities. They use their own agricultural products for household consumption and sell if there are some extra.

3.3.2. Social capital related

Pertaining to the type of social networks, it is observed that different formal and informal social networks exist in the hinterlands. These include farmers associations, cooperative associations, women's associations, informal credit associations called Equb[i], informal social gatherings called Edir[ii] and informal local gatherings organised for the purpose of monthly religious festivities and memorials of saints. It is pragmatic to see from the information

collected that the rural households' interest in participating in these networks is inspired by some economic and social benefits gained from the networks. Participants revealed that being involved in these networks is vital for their livelihoods as it enables them to acquire crucial information related to markets, credit, aid and new government legislations and directives. Principally, social networks such as the informal local gatherings organised for the purpose of monthly religious festivities and memorials of saints are crucial ones for the livelihoods of the rural households. Many of them reported that participating in these types of events helps them in obtaining key information about the market, new government interventions and other activities, which in turn have a significant impact on their livelihoods. One household head named Hadush[iii], age 52, from one of the farthest hinterlands, and illustrates the point as follows:

> 'I have monthly memorials of saints in my home but I usually go 3-5 times a year to neighbouring hinterlands to attend some bigger religious ceremonies. These kinds of arrangements are a little bit tiresome, but crucial benefits for my livelihoods are obtained. Being involved in these informal social events enables me to meet my family members and friends who come from different rural as well as urban areas. More importantly, it creates a good opportunity for me to inform them about my local agricultural products (such as honey, butter and some grains and crops). Usually it is during this time that I get a request from the urban dwellers to supply agricultural products, especially for those butter and honey products'.

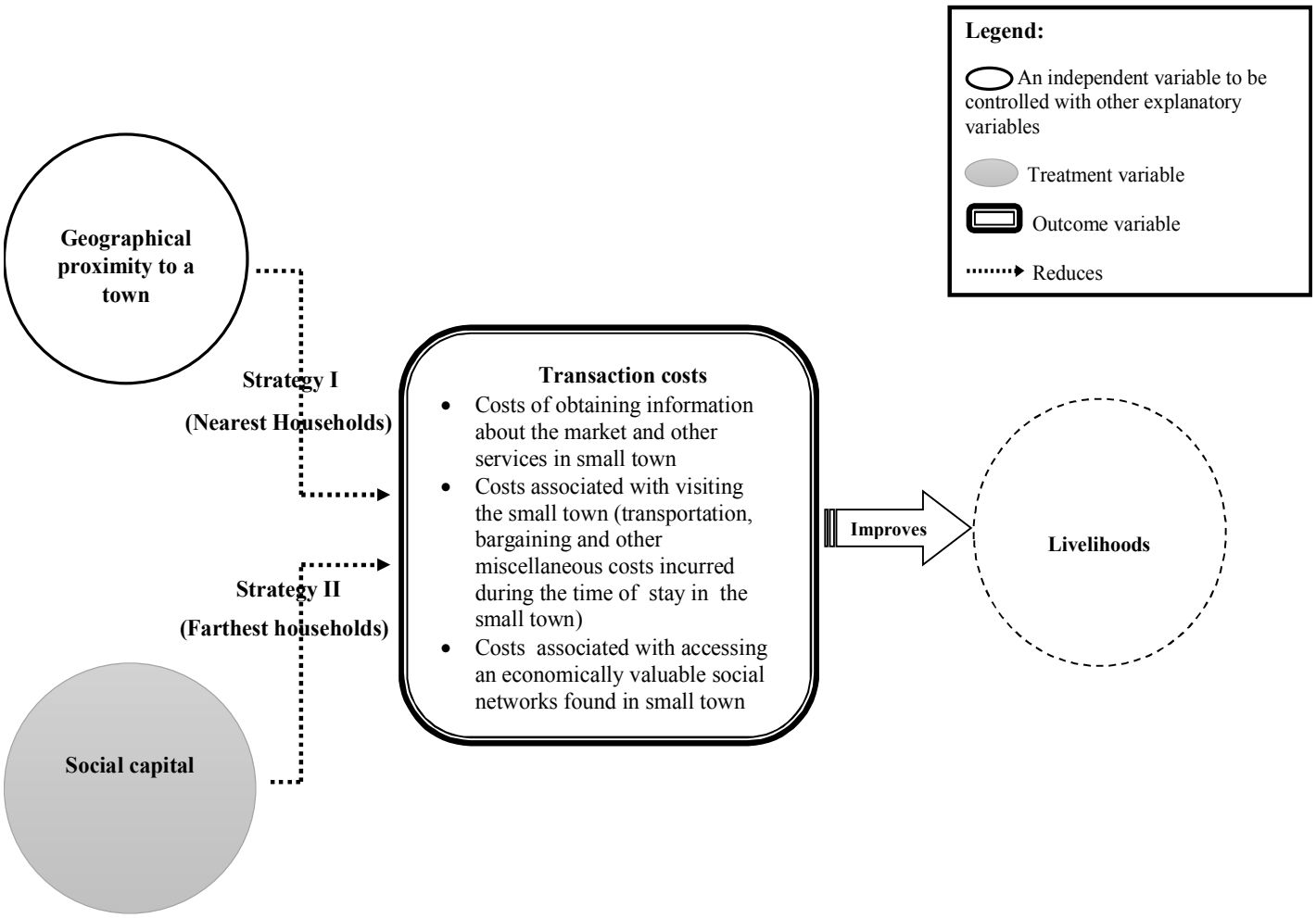
Here much attention is needed to see how economic transactions are linked with social networks in a way that improves livelihoods. As many of the focus group discussants explained, due to the economic gains associated with the networks, they are willing to exert considerable effort to engage in these social/religious networks. The story of one farmer illustrates this point:

Seged, about 49, lives in the 'Amanit' hinterland in the Degua Tembien district of the regional state of Tigray, Ethiopia. He didn't have an accessible market network where he could sell his honey and milk products, so one day he decided to consult his friend Berhanu, whom he believed has better social acceptance and information about the market. Berhanu advised him to join the annual religious gathering organised for memorials of saints in neighbouring hinterlands. Berhanu's advice was based on the idea that plenty of people who came to the event could purchase some agricultural products such as honey and butter. Initially Seged was reluctant due to the fact that going to these hinterlands is tiresome and time consuming, but later he was persuaded by his friend to accept the offer. After accepting Berhanu's idea, then, having 20 kilograms of honey and 4 kilograms of butter, Seged decided to go to the neighbouring hinterland called 'Michael Abiye' to attend the annual religious event, meet family members and sell his products. After a lot of ups and downs, he finally managed to arrive and sell his products to family members and relatives who came from urban areas before he even chased new clients. After doing this transaction, Seged rushed to his home and planned how he could exploit these social networks in a way that would improve his livelihood. Since that time he is selling his livestock products mainly through these networks.

From the aforementioned cases it is clear that embeddedness in social networks forms a critical context for economic transactions. Considering these clues, hence, there is an urgent need to strengthen and model the findings in a way that technically assesses the relationships among core variables. To this end, a theoretical model is developed and an advanced econometric model is employed to test and estimate the findings. The details are presented in the forthcoming sections.

3.4. Transaction costs and social networks: a theoretical framework

Figure 3.1: A theoretical framework of the effect of participation in social networks on transaction costs



Source: Constructed by the authors

The theoretical framework in Figure 3.1 is developed mainly on the theoretical assumption that enhancing social capital reduces transaction costs in a way that improves livelihood or income. It hypothesised two causal mechanisms, participation in social networks (i.e. an indicator of social capital) and geographical proximity, as keys for reducing transaction costs and improving livelihoods. The literature in the following paragraphs gives a more specific theoretical account of both mechanisms and explains how the relationships work. They also revealed that both social capital and geographical proximity potentially have the ability to reduce market transaction costs. On top of this, however, it is worth noting how the applicability of these mechanisms affects livelihoods under different circumstances. Here much attention is given to how social capital can be used as an alternative livelihood strategy for minimising transaction costs in cases where there are no advantages of geographical proximity.

To begin with, transaction costs, in different disciplines related to economics and social sciences, basically refer to the costs that are associated with economic exchange. These may comprise the costs associated with searching and processing market related information (Alchian & Demsetz, 1972; Hoff & Stiglitz, 1998); bargaining costs of contracts (Williamson, 1981); policing, monitoring and enforcement costs (Bardhan, 1991; Eswaran & Kotwal, 1985; Fafchamps, 1998; Greif, 1993; North, 1989). Transaction costs are unique to each economic actor (Gabre-Madhin, Fafchamps, Kachule, Soule, & Kahn, 2001), and it is difficult to find common ground on which to prepare a detailed list of these costs. Each economic actor involved in transactions hence conducts transactions on the basis of his or her own specific transaction costs. In this paper, transaction costs refer to the costs of obtaining information about the market and other services in a small town, costs associated with visiting the small town (transportation, bargaining and other miscellaneous costs incurred during the time of stay in the small town) and costs associated with accessing the economically valuable social

networks found in the small town. Ideally, though there is no universally agreed mechanism to reduce transaction costs, there appears to be a general consensus on the importance of identifying some key factors that possibly have an effect on transaction costs. Essentially, geographical proximity to towns and social capital are among the crucial factors that theoretically are believed to have an effect on these costs (Fussell, Harrison-Rexrode, Kennan, & Hazleton, 2006).

Geographical proximity to towns basically plays a key role in reducing market transaction costs and improving livelihoods (Tacoli, 2006). In Ethiopia, for instance, rural people who live near market towns incur a relatively small amount of transaction costs resulting from distance, due to the fact that they can easily undertake a significant proportion of their market transactions compared to those in the farthest locations (Dercon, Hoddinott, & Woldehanna, 2005). Von Braun (2007) in his study of rural-urban linkage considered a spatial dimension, which appreciates reduced transaction costs, as a crux for rural-urban integration and livelihood improvement. Wiggins and Proctor (2001) also noted that spatial proximity and access to towns offer a comparative advantage in reducing economic costs and fostering rural livelihoods. Notwithstanding this, it is of paramount importance to look at options in cases where there are no proximity advantages. Under such circumstances, social capital can be a worthwhile strategy.

Fundamentally, the contemporary advancement of the concept of social capital has been marked by three prominent authors – Bourdieu (1986), Coleman (1988) and Putnam (1995) – with a number of additional authors then contributing to the existing multidisciplinary concept (Adam & Rončević, 2003; Malecki, 2012). The concept covers a wide spectrum of notions that embody various definitions and approaches (Astone, Nathanson, Schoen, & Kim, 1999). To coincide with the aim of the study, emphasis is given to the definitions that primarily

focus on the embeddedness of economic activities within social networks that consider relations actors have with other actors (bridging) (Woolcock, 2004). Bridging refers here to social networks and relations between socially heterogeneous groups. This enables different groups to share and swap information and ideas, and it enhances accord among groups representing assorted interests (Fukuyama, 2001). The main reason for stressing the 'bridging' of social capital is that the livelihoods of the rural people in the selected study areas are mainly affected by the transactions embedded within social networks made with more distant colleagues and associates from different areas. These may consist of urban dwellers, traders and other groups of people from diverse livelihoods who are involved in different social networks. In this case, if the rural households tend to transact with these different groups with whom they have weak ties, it is highly likely that they would get new information that is different from the people who know roughly the same things that they do. This would be, of course, an opportunity incurring positive effects that ripple through their livelihoods. In the literature, these types of relations are characterized by the 'strength of weak ties', as portrayed by Grannoveter (1983). Hence, it makes sense to emphasise the bridging of social capital rather than other aspects of it.

Most studies on social capital have been seeking to explore what social capital actually is, but what it does remains less explored (Rutten, Westlund, & Boekema, 2010). Consequently, to date, little emphasis has been given to how social capital minimises transaction costs in a way that improves livelihoods, presumably due to the difficulty of measuring it. However, the arguments in the following paragraphs reveal that social capital does have an economic benefit. Portes and Sensenbrenner (1993), for instance, argue that social capital is: 'those expectations for action within a collectivity that affect the economic goals and goal seeking behaviour of its members, even if these expectations are not oriented toward the economic sphere' (p. 1323).

Woolcock (1998) stresses the information, trust and norms of reciprocity embedded in an individual's social networks. Pennar (1997) developed the view that individual behaviour could be affected by a mesh of social links that ultimately affects economic growth. Nahapiet and Ghoshal (1998) consider the relational networks and the potential assets that the network generates to be fundamental characteristics of social capital. They argue that social capital should be viewed from the perspective of the capability of the social networks possessed by an individual or social unit in mobilising the actual and potential assets embedded within the network. The work of Granovetter (1985) on 'social embeddedness' spurred a remarkable debate on how economic activities are embedded within social networks. In his work, Granovetter (1985) tries to divide activities as economic and non-economic and argues that non-economic activity has an effect on economic activity on the condition that the activities are combined with each other through what he calls 'social embeddedness'. According to him, economic activities are embedded in non-economic actions/institutions such as social networks, culture, politics and religion, and ultimately the non-economic action affects the related costs for economic activity (Granovetter, 1983, 2005). This view can essentially be analogous to how participating in non-economic actions such as social networks affects related costs for economic activity such as transaction costs. Earlier, Granovetter (1973) attempted to elucidate how the nature of these ties affects economic transactions in his prominent work on 'the strength of weak ties'. According to him, crucial, unique and non-outmoded information is more likely to be transmitted through weak ties than strong ones. He argued that if individuals move to different circles from their own, they have a chance to get better sources of information when they actually need to go beyond what their own group knows (Granovetter, 2005). Consequently, they can easily decide to participate in social networks found beyond their own local areas with the intention of getting crucial information related to the market and exploiting the economic benefits of reduced transaction costs. From these theoretical arguments, hence, it is easier to find clues as to why and under what circumstances

rural households participate in social networks, which in turn leads to an alternative livelihood strategy. This paper, therefore, uses these theories in an attempt to take into account the resources embedded in social networks and their effects on economic transactions. The point of departure here is addressing how social capital can be used as an alternative livelihood strategy to reduce transaction costs in situations where there are no advantages of spatial proximity. In this light, the foregoing theories serve as launching pads to model the relations among the different variables that the theories suggest may have effects. This is a critical step that sheds light on understanding how livelihood is enhanced by properly articulating the wider role of social capital.

3.5. Methodology

3.5.1. The data and survey design

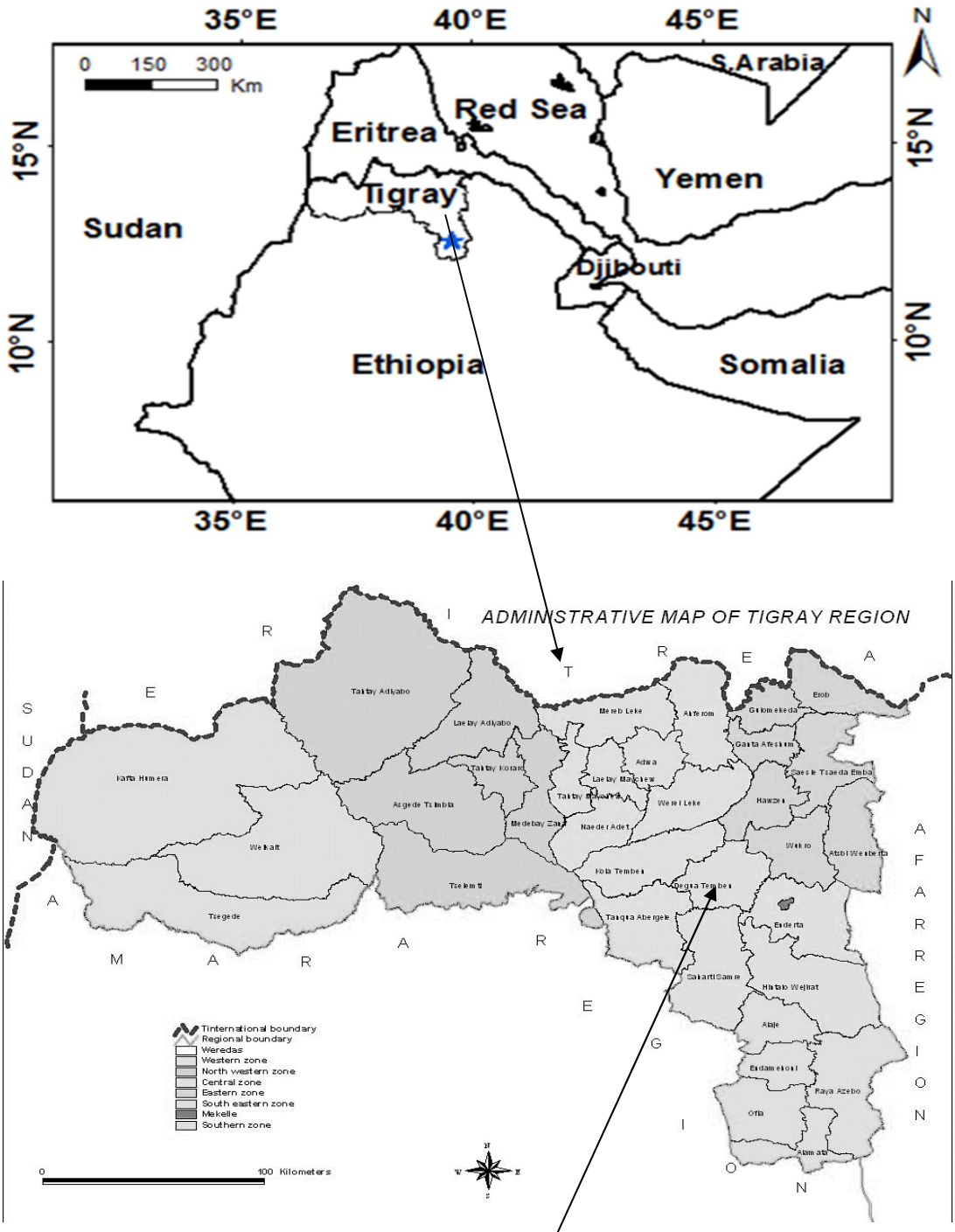
We use primary data collected from a survey conducted between May 2014 and September 2014. The survey was conducted in the Degua Tembien district of the Tigray regional state of the Federal Democratic Republic of Ethiopia. One small town, namely Hagereselam, and six rural hinterlands, namely Micheal Abiye, Selam, Limeat, Amanit, Mizan Berhan and Endaselassei, were selected as study areas. In selecting the small town, purposive sampling was used, whereas the hinterlands were selected using a cluster random sampling technique. As stated at the outset, a two-hour cut-off distance from the small town was used to categorise the hinterlands as 'nearest' and 'farthest'. Considering this, three hinterlands (Micheal Abiye, Selam, Limeat) from the nearest cluster and three (Amanit, Mizan Berhan, Endaselassei) from the farthest cluster were drawn. The demographic information and an administrative map of the selected study hinterlands are presented in Table 3.1, Figure 3.2 and Figure 3.3.

Table 3.1: Demographic data of the study hinterlands

	Male	Female	Total	Male Headed	Female Headed	Total
Micheal Abiye	2854	2635	5489	995	252	1247
Limeat	2444	2723	5167	952	232	1184
Selam	1958	1756	3714	678	166	844
Amanit	1559	1641	1641	684	143	827
Mizan Berhan	2077	2069	4146	791	151	942
Endaselassei	1732	1643	3375	462	327	789
Grand total	12624	12467	23532	4562	1271	5833

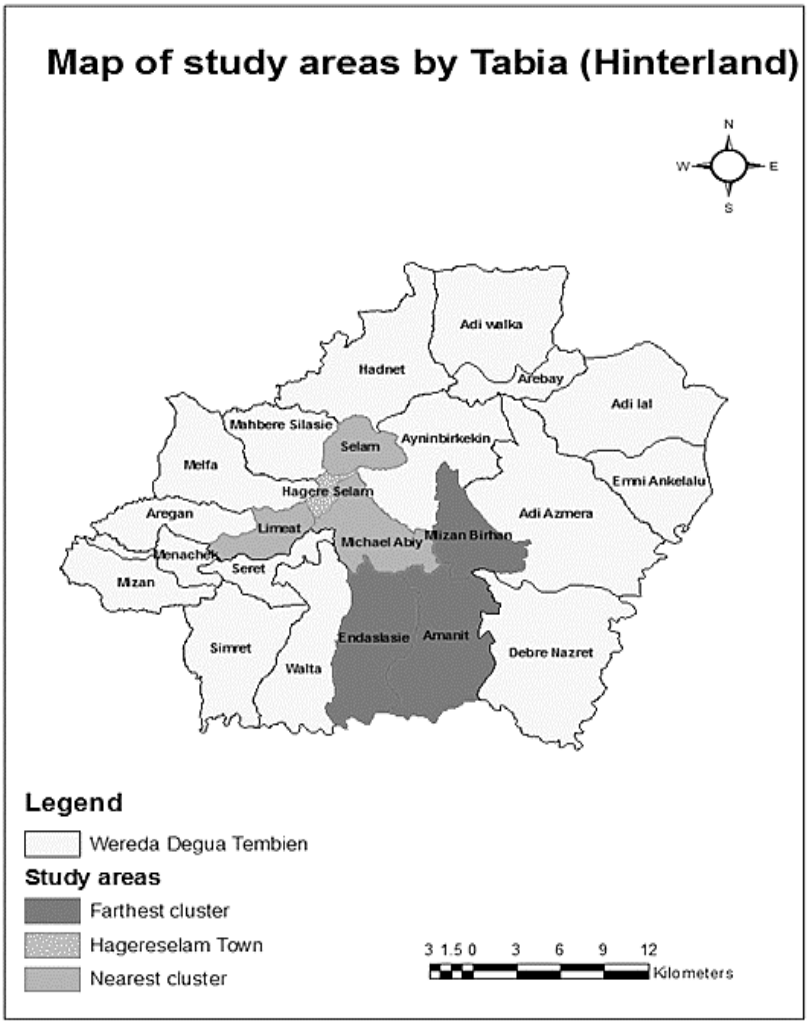
Source: Degua Tembien District Finance and Economic Development Office, 2012

Figure 3.2: Administrative map of the study area by region[iv] and district



The study area (Degua Tembien district)

Figure 3.3: Degua Tembien district/ Wereda[v] and the study hinterlands/ Tabias[vi]



Source: The Central Statistical Agency of Ethiopia

3.5.2. Sampling

In selecting the sample household heads, first an effort was made to identify those household heads who participate in any social networks by asking the question: 'Are you a member of any groups, organisations or associations?' After giving their answers, the households were then asked about their degree of participation in social networks, through such questions as: 'To what extent do you consider yourself to be actively participating in the group, such as by attending events, volunteering your time in other ways, or leading the group, etc...?' Based on their replies, a total of 260 household heads consisting of 106 active participants and 154 not active participants, were then drawn purposely. This approach helped us to properly model and generate our variable for the level of participation in social networks. Ideally, though the issue of how many comparison households should match with so-called 'treatment' households is closely related, having a relatively lower number of 'treated' households (i.e. 106 active participants) compared to those in the 'control' group (i.e. 154 not active participants) would enable the treated households to get more than one match from the control group, which ultimately would improve the precision of the estimates (Dehejia & Wahba, 2002).

To comply with the aim of the study, which aspired at examining whether or not active participation in social networks reduces transaction costs created as a result of spatial distance, it is prudent to analyse the problem from both geographical and social networks perspectives. In general, the data set obtained from the selected households is basically framed on the basis of the following matrix.

Table 3.2: A Social - Spatial Livelihood Matrix (SSLM)

		Level of participation in social networks	
		Active	**Not active**
Households	**Nearest**	**Strategy III** (Using both social networks and geographical proximity)	**Strategy I** (Using geographical proximity)
	Farthest	**Strategy II** (Using social networks)	Not applicable to benefit from either strategy

Source: Developed by the authors

The SSLM in Table 3.2 revealed that rural households closer to market towns and having active participation in social networks would presumably benefit by adopting strategy III (i.e. using both social networks and geographical proximity) to improve their livelihoods. However, in cases where these households have a significantly lower level of participation in social networks, using the spatial proximity (i.e. strategy I) is more advantageous in enhancing their livelihoods. In supporting this, Abbay and Rutten (2016) noted that rural households closer to market towns were found to have a significantly higher income than those that were farther. This infers that exploiting the spatial advantage of closer households is a compelling strategy for boosting their income and enhancing their livelihoods. On the contrary, this alerts the farthest households to seek an alternative livelihood strategy that minimises the effect of distance. To this end, strategy II (i.e. using social networks) would be the best fit strategy. In this sense, those farthest households with active involvement in social networks could benefit immensely from using these networks as a livelihood strategy to partially compensate for the benefits lost as a result of geographical distance.

Unlike these, those farthest households with no active involvement in social networks would not benefit from employing both strategies under consideration. Hence, to comply with the aim of the study, much attention is given to the data collected from the farthest households having active participation in social networks (i.e. Strategy II). In estimating these, a complete list of demographic, institutional, welfare and asset possession and socio-economic variables were generated using the questions framed based on the above-mentioned matrix. Here, our main variable of interest is the level of participation in social networks. The data collected then allows us to examine the effect that participation in social networks has on transaction costs. The details of the specification and modelling of the variable are presented in the econometric modelling section.

Overall the data gathered from the selected respondents is analysed using descriptive statistical analysis and advanced econometric analysis. To this end, using a quantitative approach, the effect is modelled and explained by applying an advanced econometric model called the Propensity Score Matching (PSM) method. STATA.14 is used to run the technical analysis.

3.5.3. Econometric modeling: the propensity score matching method (PSM)

To estimate the effects of the level of participation in social networks on reducing transaction costs, it is necessary to analyse the sample household heads with active participation in social networks (the treatment group)[vii] as compared to those with no active participation in social networks (the comparison group)[viii]. To this end a propensity score matching (PSM) technique, which is a non-parametric estimation method, is used. Propensity score matching has become

a widely applied approach in very diverse disciplines (Caliendo & Kopeinig, 2008) and is a well-liked technique for the estimation of average treatment effects[ix] (Shaikh, Simonsen, Vytlacil, & Yildiz, 2009). The method is mainly based on the work of Rosenbaum and Rubin (1983), who propose a statistical matching using the propensity score – the predicted probability that a unit receives the treatment of interest – in order to make comparisons between units with the treatment and those without. Rosenbaum and Rubin (1983), Smith and Todd (2005) and (Heinrich, Maffioli, & Vázquez, 2010) mainly view propensity scores as the conditional probability of getting a 'treatment' given pre-treatment features.

First, the paper applies PSM by considering household heads' level of participation in social networks as a dichotomous 'treatment' denoted by 'Active' and 'Not active'. Then, an effort is made to specify the model to estimate the propensity scores of the effect of the level of participation in social networks on transaction costs. Following the notation of Heckman, Ichimura and Todd (1998) and Smith and Todd (2005), we assume that treatment D is a binary variable that determines if the observation has the treatment or not. In our case the treatment factor is the level of participation in social networks. Then, let D=1 if a unit of household has an active level of participation in social networks and D=0 otherwise. The outcome for the households with an active participation (D=1) and for those without active participation (D=0) are then defined as Y_1 and Y_0 respectively. Here, our aim is to compute the average treatment effect on the treated (ATT), i.e. the effect of the level of participation in social networks on active participants in social networks.

$$\text{ATT} = E(\Delta / X^*, D=1) = E(Y_1 - Yo / X^*, D=1) = E(Y_1 / X^*, D=1) - E(Yo / X^*, D=1) \quad \text{.....Equation (1)}$$

Where X^* is a multidimensional vector of pre-treatment features. The first term on the right-hand side of Equation 1 is observed. However, the second term on the right-hand side, i.e. $E(Yo/X^*, D=1)$, is unobservable. Considering this, the application of PSM in computing the counterfactual outcome for households having an active level of participation in social networks is compelling. Let $P(X^*) = Pr(D=1/X^*)$ be the probability of being an active participant in social networks of X^*. By matching[x] the households with an active level of participation in social networks to households without active participation in social networks with similar values of P(X), the PSM thus develops a statistical comparison group (Ahmed, Rabbani, Sulaiman, & Das, 2009). However, the matching will only be valid if it rests on certain assumptions. The ignorable treatment assignment (Rosenbaum & Rubin, 1983) or selection of observables (Heckman & Robb, 1985) is the first and most basic assumption underlying matching estimators. It assumes that after controlling for the X^* set of observable covariates, the outcome will be independent of the treatment status (Ham, Reagan, & Li, 2005). In other words, the treatment on the basis of the level of participation in social networks will be as good as random after controlling for X^* covariates, and hence treated and control units should be alike on average (Heinrich et al., 2010). This is represented by:

$$(Yo, Y_1) \perp D \mid X^* \quad \text{.....Equation (2)}$$

The other assumption that makes the estimation using PSM unbiased is the common support condition. It is denoted by the following equation:

$$0 < P(D = 1 \mid X^*) < 1 \quad \text{.....Equation (3)}$$

The common support condition requires that for each value of X^* covariates, the probability of being both treated and untreated is positive. Accordingly, the probability of being an active participant in social networks and a not active participant in social networks must always exceed zero for every possible value of X^*. Proper application of this condition makes sure that the diversified features observed in the treatment group can potentially be observed among the control group (Bryson, Dorsett, & Purdon, 2002). Overall, if these two assumptions are satisfied, the estimation process will be parsimonious, and PSM will provide a valid method for estimating and obtaining unbiased and strong estimates of the average treatment effect (ATT).

3.5.4. Matching estimators

Different literature has suggested that in estimating the average treatment effects on the treated (ATT), an estimate of the propensity score is not sufficient (Becker & Ichino, 2002). Instead, different matching algorithms should be applied to compare the outcomes between treated and untreated units in the matched sample. This paper, hence, uses the nearest neighbour matching and kernel matching techniques as estimation methods.

3.5.4.1. Nearest neighbour matching

The nearest neighbour matching algorithm suggests an approach to take each treated unit and search for the control unit with the nearest propensity score (Heinrich et al., 2010). As a result, the risk of overlooking a treated unit will be avoided. In this study, the method is adopted with replacement, so that a single comparison household unit should be used as a match for more than one control unit. Basically, the decision to work with or without replacement depends on the data and the extent of the overlap in the distribution of the propensity scores. In general, matching with replacement reduces bias, while matching without replacement can improve the precision of the estimates (Dehejia & Wahba, 2002). Following the notation of Becker and

Ichino (2002), the nearest neighbour estimator is specified as follows. Let *T* be the set of treated units (i.e. households heads with active participation in social networks) and *C* be the set of control units (i.e. households heads not actively participating in social networks), and S_i^T *and* S_j^C be the observed outcomes of treated and control units. *C (i)* denotes the set of control units matched to the treated units *i* with an estimated value of the propensity score of pi . In nearest neighbour matching,

$$C(i) = \min_i \| pi - pj \|$$

denotes the number of controls matched with observation $i \in T$ by N_i^C and defines the weights $\omega_{ij}=\frac{1}{N_i^C}$ *if* $j \in$ *c(i)* and $\omega_{ij}=0$ otherwise. The total number of units in the treated group is N^T.

Hence the equation for the matching estimator will be:

$$\tau^{NM} = \frac{1}{N^T}\sum_{i \in T}\left(S_i^T - \sum_{j \in C(i)} \omega_{ij} S_j^C\right)$$

$$= \frac{1}{N^T}\left(\sum_{i \in T} S_i^T - \sum_{i \in T}\sum_{j \in C(i)} \omega_{ij} S_j^C\right)$$

$$= \frac{1}{N^T}\sum_{i \in T} S_i^T - \frac{1}{N^T}\sum_{i \in T} \omega_j S_j^C$$

Where:

NM refers to nearest neighbour matching

N^T denotes the total number of units in the treated group

ω_j is defined as $\omega_j = \Sigma_i \omega_{ij}$

3.5.4.2. Kernel matching

Kernel matching, which is a non-parametric matching estimator, presumes that all treated units are matched, with a weighted average of all controls having weights that are inversely proportional to the distance between the propensity scores of treated and control units (Smith & Todd, 2005). The advantage of kernel matching is having a lower variance achieved because of using all the observations in the comparison group. But it may have a drawback that emanates from the use of observations with bad matches. Hence proper imposition of the common support condition is a crucial one (Caliendo & Kopeinig, 2008). Overall, the formula for the matching estimator is:

$$\tau^{KM} = \frac{1}{N^T} \sum_{i \in T} \left\{ S_i^T - \frac{\sum_{j \in C} S_j^C \, G\left(\frac{pj - pi}{h_n}\right)}{\sum_{k \in C} G\left(\frac{pk - pl}{h_n}\right)} \right\}$$

Where:

KM stands for kernel matching and G*(.)* is a kernel function

h_n is a bandwidth parameter

pj is a propensity score of control observations

pi is a propensity score of treated observations

(Becker & Ichino, 2002)

3.6. Results and discussions

This part of the paper presents quantitative results to help explain the effect of active participation in social networks on minimising transaction costs and improving rural livelihoods. Specifically, it describes and models the main problems and findings in a way that technically assesses the relationships among the core variables. To this end, an advanced econometric model, i.e. the propensity score matching (PSM) technique, is used to estimate the effects.

3.6.1. Summary of the descriptive statistics

Table 3.3: Summary of the descriptive statistics

Variables	Measurement attributes	Symbols	Valid N	Mean	SD	Min	Max
Outcome variable:							
Transaction costs	The transaction cost reduced computed based on the percentage of total household expenditure per year.	*logtransactionCost*	243	6.25	.83	1.96	8.48
Treatment variable:							
Household heads' level of participation in social networks	1 if the household has active participation, 0 if not	*participation*	260	.40	.49	0	1
Other explanatory variables:							
Age of household head	Continuous variable measured in number of years	*age*	260	53.51	8.07	40	80
Sex of household head	1 if female, 0 otherwise	*sex*	260	.11	.32	0	1
Marital status of household head	1 if the respondent is married, 0 otherwise	*maritalStatus*	260	.88	.32	0	1
Occupation of household head	1 if farming, 0 otherwise	*occupation*	260	1	0	1	1
Education of household head	1 if literate, 0 otherwise	*education*	260	.02	.16	0	1
Religion of household head	1 if Ethiopian orthodox, 0 otherwise	*religion*	260	1	0	1	1

Ethnicity of household head	1 if Tigrian, 0 otherwise	*ethnicity*	260	1	0	1	1
Presence of household head	Total number of months presented per year	*presence*	260	11.88	.50	8	12
Household's spatial proximity to a small town	1 if nearest, 0 if farthest	*proxTown*	260	0.43	0.49	0	1
Road type	1 if all-weather roads, 0 if seasonal road	*roadType*	260	.35	.47	0	1
Frequency	Number of visits to the market in the small town per month	*frequency*	260	1.42	.73	1	4
Off-farm work	1 if yes, 0 if no	*off farmWork*	260	.75	.43	0	1
Off-farm income	Amount in ETB per year	*off farmIncome*	260	491.69	551.45	0	2500
Households' close family	1 if yes, 0 if no	*closeFamily*	260	1	0	1	1
Family contact	1=Everyday, 2=5-6 times a week, 3=3-4 times a week, 4=Once or twice a week, 5=Once or twice a month, 6=3-4 times a year, 7=Once or twice a year, 8=Less often	*familyContact*	260	3.76	.99	2	5
Households' close relatives	1 if yes, 0 if no	*closeRelatives*	260	1	0	1	1
Membership	1 if yes, 0 if no	*membership*	260	1	0	1	1
Ability to get new information by being a member	1=No/Very little, 2=Little, 3=Moderate, 4=Much, 5=Very much	*newInformation*	259	3.8	.74	1	5
Learned something valuable by being a member	1=No/Very little, 2=Little, 3=Moderate, 4=Much, 5=Very much	*valuableInformation*	259	3.61	.88	1	5
Land size	Total land size measured in acres	*landSize*	260	.46	.42	.125	2
Land ownership	1 if own land, 0 otherwise	*tenure*	260	1	0	1	1

Irrigated land	1 if yes, 0 if no	*irrigatedLand*	260	.20	.40	0	1
Livestock ownership	The number of livestock in Tropical livestock units (TLU)	*livestock*	260	3.56	.93	1.12	7.16
Credit	1 if yes, 0 if no	*credit*	260	.65	.47	0	1
Access to market information	1=Quite difficult, 2=Difficult, 3=Neither, 4=Easy, 5=Quite easy	*marketInformation*	260	1.46	.57	1	3
Livelihood income	Total household expenditure in Ethiopian birr (ETB) per year	*Income*	260	9731.63	5324.15	2800	48000

3.6.2. Econometric analysis

Our estimation approach ensues in four steps. First, various demographic, intuitional, welfare and asset possession and socio-economic covariates that are theoretically believed to have an effect on the dependent variable are identified and incorporated in the model. Second, using the propensity score matching method, the Logits for the variable 'levels of participation in social networks' are estimated. Here it should be noted that the household heads' level of participation in social networks is our treatment factor, where households are categorised either as having active participation or not having active participation. Third, the balancing properties of the propensity scores are checked by selecting and enforcing a common support region. Finally, based on the propensity scores the average treatment effect is estimated using nearest neighbour matching and kernel matching methods.

3.6.2.1. Propensity score estimates

The details of the logit estimates of the propensity score matching model for the variable 'level of participation in social networks' are presented in Table 3.4.

Table 3.4: Estimation of the propensity scores

Household heads' level of participation in social networks	**Freq.**	**Percent**	**Cumulative**
Not active	154	59	59
Active	106	41	100
Total	260	100	
	Coef.	**Z**	**P>|z|**
Households' spatial proximity to small town	-1.993214	-4.67	0.000***
Age of household head	-.0121971	-0.67	0.501
Marital status of household head	.1320835	0.29	0.772
Education of household head	-.8485638	-0.75	0.452
Road type	-.5975984	-1.93	0.054 *
Frequency	.2314938	0.94	0.348
Ability to get new information	.2315504	0.95	0.340
Learned valuable information	.1590431	0.78	0.437
Land size	-.2480135	-0.66	0.508
Irrigated land	.1424697	0.34	0.737
Credit	-.2011041	-0.68	0.497
Livestock ownership	-.0345848	-0.23	0.815
Access to market information	.0442938	0.16	0.876
Constant	-.3339197	-0.23	0.818
Number of observations	259		
Prob > chi2	0.00		
PseudoR2	0.14		

*** p<0.01, ** p<0.05, * p<0.1

The results of the Logit estimates presented in Table 3.4 report that the percentages of active participants and not active participants are 41 and 59 respectively, showing that the treated units (active participants) have sufficient comparative units (not active participants) where the independent variables and the outcome variable are analysed in a way that compares the effect if households participate in the treatment, i.e. being an active participant in social networks. Stressing the significant variables, the results in Table 3.4 show that spatial proximity to small towns has a negative and statistically significant effect on the rural households' degree of participation in social networks. This finding suggests

that the rural households living in relatively far hinterlands are more likely to actively participate in social networks than the nearest ones. But why? One possible reason presumably could be the fact that the closer households can easily access the town services without investing much of their time in local social networks. Unlike the farthest households who must travel long distances to reach the small town and incur a relatively higher cost to obtain market information, it seems to be easier for the closer households to visit the nearby town and thereby access the market information with lesser cost. This gives an insight that closer households have a clear comparative spatial advantage in potentially minimising the transaction costs associated with obtaining market information. On the other hand, for those farthest households, the geographical distance from a town tends to leave them with limited options of accessing market information, thereby forcing them to seek an alternative livelihood strategy such as strengthening their involvement in different local networks in a way that minimises the adverse effect of distance. From these angles, hence, we could to some extent expect farthest households to participate more actively in social networks than closer ones.

The other variable that is found to be significant in affecting the variable participation in social networks is households' access to roads. According to the results in Table 3.4, the corresponding p-value of this variable indicates that it is statistically significant at a 10% probability level with a negative Logit coefficient, implying that the household heads having access to all-weather roads are less likely to actively participate in social networks than do those having access to seasonal roads. Moreover, while household heads' age, marital status, educational level, frequency of visiting a small town, access to new and valuable information, access to market information, access to credit, land size, ownership of irrigated land and livestock ownership characterise the active participants, none of them was found to be significant in affecting the variable household level of participation in social networks. Overall, the findings suggest that spatial proximity and participation in social networks are critical variables that affect livelihoods.

3.6.2.2. The common support, number of blocks and balancing property

Table 3.5 presents the statistic where the common support region for the propensity scores is formed. A common support region generally refers to the region where the balancing score has positive density for both treatment and comparison units (Diaz & Handa, 2006). The results obtained show that the region is enforced within an interval of [.117, .801]. This means that all the propensity scores fall within the selected common support interval. Furthermore, the optimal number of blocks is determined by the program to be five, and in each of these blocks the mean propensity scores do not differ for the treated and controls. Here, blocks refer to groups of observations with similar propensity sores (Heinrich et al., 2010). A test for the balancing property of the propensity score is also done for all covariates and blocks considered in the logit model to check whether the propensity scores in each of the blocks and the explanatory variables to be matched are similar or not. The results revealed that the balancing property is satisfied, and consequently the specifications used in the study are found to be complete and robust specifications that satisfy the balancing tests.

Table 3.5: Estimates of the common support region, blocks and balancing property

Common support region	Minimum	Maximum	Observations	Number of blocks
	.117	.801	251	5
Balancing property: Satisfied for all variables and blocks				
Inferior of block of pscore	Household heads' level of participation in social networks			Total
	Not active	Active		
.1179623	48	11		59
.2	41	13		54
.4	30	36		66
.6	26	45		71
.8	0	1		1
Total	**145**	**106**		**251**

3.6.2.3. Estimates of the matching estimators

Estimations based on nearest neighbor matching and kernel matching are done to test whether the level of participation in social networks makes a difference among transaction costs of the selected household heads. A footnote for sensitivity[7] is presented based on the estimations of the other matching techniques. Moreover, all the results use bootstrapped standard errors, and the focus is mainly on the average treatment effect on the treated (ATT) and the t-values. The results are presented hereunder.

3.6.2.3.1. *Estimates of nearest neighbor matching*

Table 3.6 reports that the ATT, which is the average difference between the outcome variable (i.e. transaction costs) of the households heads actively participating in social networks and of those not actively participating in social networks, is 0.540, and the t-value (i.e. the significance level) is 4.541.

Table 3.6: ATT estimation with the nearest neighbor matching method

Number of treated	Number of control	ATT	Standard error	t-value
106	53	0.540	0.119	4.541

Note: The numbers of treated and controls refer to actual nearest neighbor matches

A t-value of greater than 1.96 indicates that the difference between the treated and the control is significant. Accordingly, the results suggest that active participation in social

[7] Estimations were done based on the Radius matching (Dehejia and Wahba 2002) and Stratification matching (Caliendo and Kopeinig 2008) to examine the robustness of the estimates. Accordingly, the results show that the corresponding t-values based on the aforementioned algorithms were 6.52 and 9.9, respectively indicating that active participation in social networks significantly reduces transaction costs. These findings are similar to the results of the Kernel matching and nearest neighbor matching, as their t-values are greater than 1.96.

networks significantly reduces transaction costs in a way that minimises the income gap created as a result of distance and ultimately improves livelihoods.

3.6.2.3.2. *Estimates of Kernel matching*

The output of the statistical model in Table 3.7 according to Kernel matching results in ATT and t-values of 0.660 and 7.983, respectively.

Table 3.7: ATT estimation with the kernel matching method

Number of treated	Number of control	ATT	Standard error	t-value
106	154	0.660	0.083	7.983

The results are similar to those of nearest neighbour estimates in Table 3.6. It is evident from these outputs of the matching estimators that active participation in social networks appears to significantly reduce transaction costs in a way that improves livelihoods. But how?

According to the foregoing discussions and background information, the selected rural households participate in social networks for different social and economic reasons. The economic benefit earned from these networks is vital, and ultimately households would prefer to be active participants. What these outputs may suggest is that active participation in these types of social networks enables the rural households to obtain crucial information related to the market, which in turn has an effect on their livelihoods. One household head named Desta, age 55, from *Mizan berhan* hinterland demonstrates the point as follows:

> 'I have been participating in different social networks for different reasons. What is most crucial for my livelihood is participating in those local religious and non-religious gatherings. Apart from earning social esteem, it is from these gatherings that I usually get reliable information related to the market. I would give you one

> occurrence as an example. One day what happened is that I went to my friend's village, which is a half day's walking time away from my hinterland, to attend an annual religious ceremony commemorating one of our beloved saints. I usually go for this ceremony once a year carrying different agricultural and livestock products as a gift to my friend. One day, a family member of one of the colleagues of my friend came from *Mekelle* city, the metropolis of the region, to attend this ceremony and visit his family. My friend introduced me to the guy and we had a chance to discuss about ourselves. The guy was a manager of a nearby rural road construction project, which has a big camp for its employees' accommodations near my friend's village. Upon talking to the guy, I realised that he could help me in some aspect of my life. I was very anxious to tell him about the marketing related problem that we have and finally I did manage to do so. Fortunately, he told me that he would give me a chance to supply different agricultural crops and livestock products to his camp without any precondition. He also promised me that he would offer me a reliable price unlike that of other market intermediaries. Then I thanked him for his kindness. I wished to present my appreciation to him in order to increase the relation between me and him. Beginning this moment, I started to supply my marketable agricultural and livestock products on a regular basis to the camp employees. Now it is my second year of supplying my produce to the camp, and this opportunity is significantly changing my life. I really don't think I could have improved my income significantly if I hadn't participated in this event and met the gentleman'.

The evidence confirmed that rural households preferred to participate in these networks in order to obtain key information about the market that then ultimately enables them to enhance their livelihoods. The striking point about this finding is the importance of verifying the effect that non-economic actions (such as participation in social networks) have on economic actions. We infer from the evidence that rural households decided to make a considerable effort to engage in the social networks with the intention of getting

economic gains. This could be a key finding that gives a clue to why rural households decide to participate in social networks. Our findings substantiate Granovetter's embeddedness argument and provide empirical proof on how non-economic actions affect economic actions. Granovetter (1985) tried to see to what extent economic action is linked to or depends on an action/institution that is non-economic, and he argued that non-economic actions such as social networks have a significant impact on economic activities.

3.7. Conclusions

This paper sought to ascertain clues to how rural households' active participation in social networks reduces transaction costs in a way that improves their livelihoods. Particularly, it developed social capital as a concept that plays a key role in influencing economic activities.

The foregoing findings provide empirical support for this, suggesting that economic action is linked to actions/institutions that are non-economic and demonstrating that non-economic actions such as social networks have a significant impact on economic activities (such as transaction costs). Moreover, the outputs of the estimation revealed that household heads having access to all-weather roads are less likely to actively participate in social networks than those having access to seasonal roads. This may imply that rural households' state of having limited access to all-weather road infrastructures prohibits them from getting out of their villages and visiting other peripheries and urban centres. This scenario eventually would force them to spend much of their time being involved in different local and social affairs within their villages.

The preceding findings also marked the relevance of participation in social networks for the livelihoods of rural people located at different distances from a town. According to the results, households that are located further away from the town have a significantly higher active level of participation in social networks than do those closest ones. The farthest

households are basically characterised by limited access to telecommunication services and other infrastructures. Given these realities, the findings thus suggest that these households might not have economical options other than using the available social networks to obtain market related information that would then minimise their transaction costs and finally affect their livelihoods. In due course, they prefer to make a considerable effort to be involved in the social networks in a way that minimises the transaction costs that could have been expended and that compensates for the income gap created as a result of distance. These findings supply a clue that if a rural household residing in a relatively far rural hinterland actively participates in different social networks, they are able to significantly reduce the transaction costs that could have been incurred had they used other mechanisms. This confers an alternative strategy for rural people to improve their livelihoods. Overall, while the paper scrutinises the role of social capital in minimising transaction costs and contributes to the customary debate on the way it provides an alternative livelihood strategy for rural people, there could be further benefit from research on the different particulars that possibly influence its nature and facilitate its pattern of measurability in different contexts. In any case, it is clear that the afore-mentioned findings are noteworthy and suggest a new roadmap for further exploration in the ongoing rich debate about the role of social capital.

3.8. Notes

i. Informal credit association where a group of individuals agrees to meet for a defined period time in order to save together.

ii. A gathering, where the farmers organise themselves with the intention of helping each other during burial services, wedding ceremonies and other special events.

iii. To maintain the privacy of the informants, we use fake names throughout the case study.

iv. A region is an ethnic-based administrative territoriality of Ethiopia that is larger than hinterlands and districts.

v. Wereda refers to an administrative unit of Ethiopia larger than tabia, similar to district.

vi. Tabia is a smallest administrative unit of Ethiopia which is similar to a ward or hinterland.

vii. A treatment group refers to the unit that is manipulated, i.e. a group that receives a treatment. In this paper, all rural households having active participation in social networks would be part of the treatment group.

viii. A comparison group refers to a group of units used as a base line measure i.e. a group that doesn't receive a treatment. As a result it is meant to serve as a source of counterfactual causal inference (Rosenbaum & Rubin, 1983). In our case, all rural households with no active participation in social networks would be part of this group.

ix. The average treatment effect is a measure used to compare treatments in randomized experiments. It mainly measures the disparity in mean outcomes between units assigned to the treatment and units assigned to the control.

x. Matching is a common technique which involves blending treatment and comparison units that are similar in terms of their observable characteristics (Dehejia & Wahba, 2002).

3.9. References

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4 SOCIAL STATUS, SOCIAL NETWORKS, AND LIVELIHOODS [8] [9]

Abstract: This paper scrutinized the links between social status and income of rural households to provide insight into how social status is indicated and used as a strategy for improving livelihood income. It also provides a brief look into some selected key determinants of livelihood income. We applied a two-stage least squares estimation to household-level data from rural areas in the Tigray regional state of Ethiopia. We also proposed the latent class analysis model to identify the number of classes for the variable "social status." The results indicate that livelihood income is significantly affected by households' social status, indicating that high status household heads tend to enhance their participation in different social networks with the intention of strengthening the social bonds that they have and improving their status in the community, which in turn has an economic payback. Apart from this, household heads' access to off-farm work, size of owned land, exposure to multimedia, livestock ownership and spatial proximity to towns were the variables that have significant positive effects on livelihood income.

Keywords: Social status; Social networks; Latent class analysis; Two-stage least squares; Ethiopia; Livelihoods.

JEL Classification: R12 · Z10 · Z13

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4.1. Introduction

Social status is viewed as the degree of honor or prestige attached to one's position in a society (Brown & Mey, 2009; Davis & Moore, 1945). It generally implies social stratification on a vertical scale. Most societies in the world do have some form of social ladder with some individuals in stronger, more dominant positions and other people in lower positions (Maiese, 2004).

Most often the individuals having a relatively better position within a society tend to use their status for various purposes. For example, households in rural Ethiopia use their status as a means to attain a diverse range of critical social and economic outcomes, such as improving their asset possessions and income (Briggs & Blatt, 2009; Ephraim, 1971). Basically, the different aspects of the effects of status on the livelihoods of rural people are critical in addressing recent endeavors of rural economic development. In this context, social status can be used as a signal, which is socially and economically important for the rural poor in using different livelihood strategies (Weiss & Fershtman, 1998).

The theoretical and empirical work for understanding and assessing status and its effects on different socioeconomic activities tends to vary with social context. In the past decades, economists and sociologists used to treat the economic and social aspects of social status independently. Consequently, the issue of how to mainstream social status in economic analysis has remained a mystery (Coleman, 1994; Smelser & Swedberg, 2010). Thanks to the growing amount of socioeconomic literature, these days, the issues of social status in an economic sense and the mechanisms to attain it, specifically in a developed countries context, are becoming centers of policy debate in diverse sociological and economics-related undertakings. Accordingly, various factors are at play in indicating and determining one's status in a society. These may comprise occupation, education, income and wealth

(Adler & Stewart, 2007; Barratt, 2006; Blau & Duncan, 1967; Blishen, 1958; De Graaf, Ganzeboom, & Kalmijn, 1989; De Graaf & Luijkx, 1993; Diemer, Mistry, Wadsworth, López, & Reimers, 2013; Duncan, 1961; Pineo & Porter, 1967).

Notwithstanding this, little evidence has been documented to address its economic implications and the factors affecting it from the developing countries' perspective. Given this gap, hence, it is compelling to identify what variables are likely to manifest status in a developing countries context other than those indicators attributed to developed nations. The prologue of this consideration in an economic analysis demands preliminary knowledge and careful consideration of different contexts (Fershtman & Weiss, 1993).

Within this perspective, the paper aimed at empirically testing the household-level data on how social status is important for the ability of livelihoods to generate income and what specific variables are used to indicate status in a developing countries context. While attention was given to the economic paybacks of some key variables such as proximity to towns, the focus remained on scrutinizing the economic benefits earned from status. For this purpose, first, a set of theoretically tested key variables that potentially have a relation with status and livelihood income were identified. Second, primary data was collected using a structured questionnaire from the sample households selected from the six study hinterlands of the Tigray regional state of Ethiopia, namely Micheal Abiye, Selam, Limeat, Amanit, Mizan Berhan and Endaselassei. Extra information was also gathered from 12 focus group discussants selected from the six hinterlands. The main function of the focus group discussion was to give an empirical background of the study areas. Third, an effort was made to measure social status based on some indicators obtained from the empirical data that was collected using questionnaire and focus group discussion. To do this, factors such as household heads' degree of participation in social networks, access to market information, ability to learn something valuable by participating in social networks, ability to get new information by participating in social networks and exposure to multimedia were chosen as

indicators. Based on these indicators, a latent class analysis (LCA) was done to determine the number of social status classes and to assign households to these latent classes. Moreover, to empirically test the relation between social status and livelihood income, we proposed applying the two-stage least squares (2SLS) estimation to household-level data from the selected hinterlands. In contrast with the ordinary least square (OLS) method, this 2SLS estimation method enables us to capture the measurement error by introducing the so-called instrumental variable (IV). Lastly, based on the results of the estimates for regression coefficients, critical analysis was done to test and measure the extent to which social status affects income of rural households. Based on such information, it would be possible to slot in social status considerations in an economic analysis and thereby stimulate the policy debate in the respective fields.

4.2. Background information: Stories from households

Keeping in mind the end goal, to appropriately address the study's point it is basic to at first see the foundation data on what social status in the selected hinterlands looks like and how it affects individuals' income. To do this, initially an arrangement of precisely composed questions was readied. At that point a focus group of 12 rural households made up of two households from each of the six rural hinterlands was formed. In doing so, some determination criteria, such as gender, age and other demographic elements were contemplated. The main purpose of the focus group discussion was to provide detailed empirical background information about the households in the study hinterlands and to clear up few key points about the quantitative investigation. Hence, this part of the paper presents the background information collected through the focus group discussion and provides some stories from the households.

4.2.1. Status, social networks and livelihood income

The information collected using the focus group discussion revealed that social status in the study hinterlands refers to one's standing in the community and his position in the social hierarchy. In other words, it refers to the relative rank that an individual holds in a social hierarchy based upon honor or prestige. The majority of the focus group discussants noted that individuals having a relatively higher status earn better income compared to the low status ones. According to their replies, basically one's status in their communities is mainly determined by their degree of participation in social networks. They underlined that participation in social networks is the chief indicator for defining one's status because almost all of them share similar status indicator variables such as education, occupation and wealth. A majority of them explained that households' active participation in different social networks, as an individual characteristic and as an interaction between individuals, is an essential factor in improving their status and income. They noted that, along with other economic reasons embedded within the social networks, participation in social networks is motivated by the desire to achieve higher status. On top of this, they strongly believe that active participation in social networks paves the way for them to be positively perceived by the society and builds their esteem within their society, which in turn yields economic benefits, namely an improvement in income. The main reason for this is that these households manage to receive higher respect and love from the society because they are viewed as loyal representatives in various social and economic matters in the community. Consequently, they would potentially get a chance to influence different transactions and thereby improve their livelihood income. One household head named Kahsu[i], age 62, demonstrates the point as follows:

> "……. here in our community there are some household heads whom we see as high status ones. Besides their own personal life these people are exceedingly dedicated in tending to a lot of local issues credited to our locality, for example, by speaking to us and seeking to tend to our issues with administrative authorities, giving reliable information identified with the market, new government rules and most recent improvements that have an immediate and circuitous impact on our livelihoods, and by settling diverse social issues like marriage related issues, clashes among people, and others. The majority of them are financially better and earn higher income contrasted with different household units living in our locality. We cherish and regard them highly, as they are regularly on the front line of managing our regular social and economic matters by actively participating in different social organizations that we have in our community. That is the reason we normally choose them to lead and aide us in distinctive occasions and affiliations. For example, it is these households that we choose to arrange and lead neighborhood credit affiliations called Equb[ii]. We believe in them, and a greater part of households in our community are intrigued to join forces with them to do business-related activities that are critical for livelihoods. ……."

It is worthwhile to see in the story that household heads' status, in the perception of others, is crucial in improving livelihood income and is associated with the degree of participation in social networks. A similar understanding is also observed from the focus group discussants that active participation in social networks, as an individual characteristic and as an interaction between individuals, enabled them to improve their status within the society and thereby improve their livelihood income. The story of one high status

household head named Abadi, age 55, from one of the nearest hinterlands illustrates the point as follows:

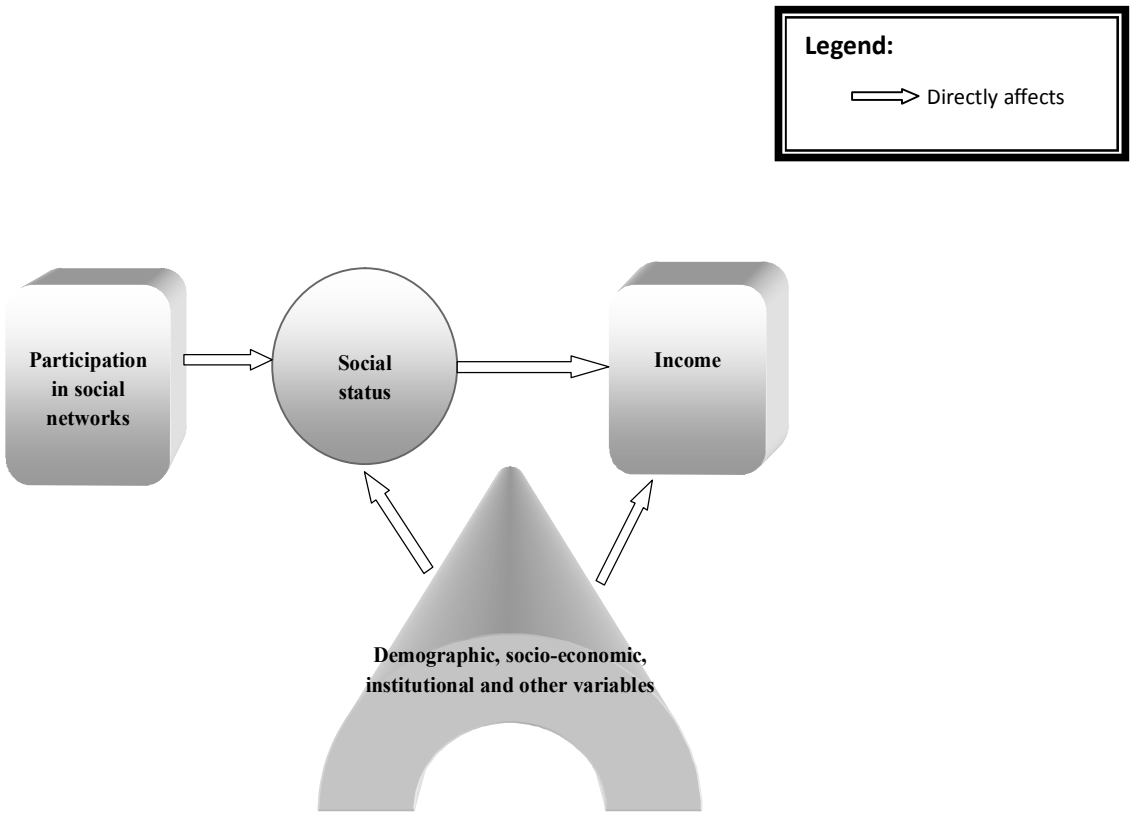
> "…….other than the family obligation that I have, these days I am taking part in different social networks. For instance, I am serving as the head of the local credit affiliation called the Equb. This credit association was initially organized by farmers who are involved in irrigation farming. Moreover, I am a board member of the irrigation cooperative and construction project of a new church. It is my third time to be elected as a committee member. In recent times I learned that the respect and positive perception that people in our community have of me has improved. This motivates me to be curious more in my activities and involvement in the community. I am proud to be part of this community. They always show me affection and regard, and in many transactions, they often ask me to deal on their behalf. This gives me a chance to have a direct contact with the agricultural traders and intermediaries who come from urban areas and get the latest and most timely information about the market. Indeed, this is improving my livelihood significantly and guiding me to strictly adhere to a market-led livelihood that could potentially boost my income…."

The abovementioned empirical cases highlighted that household heads' status is an important factor in improving livelihood income. Moreover, household heads' participation in social networks appears to be related with status. This suggests that household heads' status could be indicated and instrumented using the relational aspect of social capital, i.e. their degree of participation in social networks. Theoretically, the social capital literature elucidates the concept of social capital as an individual characteristic (Bourdieu & Wacquant, 1992) and as a social interaction between individuals (Coleman, 1994). As an individual characteristic, individuals can own social capital. As a relational aspect,

individuals cannot own social capital because it is the outcome of social interactions (Rutten, Westlund, & Boekema, 2010; Westlund & Bolton, 2003). Capturing the relational perspective and the foregoing empirical evidence thus, it can be argued that social status in an economic sense (i.e. improving income) does address the relational aspect of social capital. The idea can be further complicated by the debate over whether livelihood income, along with other variables such as proximity to towns, is affected by status. This gives a clue as to how to indicate status, on the one hand, and how it affects livelihood income, on the other hand. To this end, it is of paramount importance to properly model and statistically test the aforementioned initial findings in order to obtain unbiased results. Doing so would make it easier to develop a rational platform to enrich the literature of social capital using the concept of social status.

4.3. A theoretical framework

Figure 4.1: A theoretical framework for the effect of social status on income



Source: Constructed by the authors

The conceptual framework in Figure 4.1 is constructed mainly on the theory that a latent variable, rural households' social status as instrumented by their degree of participation in social networks, is seminal in improving their livelihood income. To tackle this, first, a theoretical foundation is provided to address how participation in social networks helps in attaining better status. Thereafter, an effort is made to examine theoretically how the paybacks of status from an economic perspective are specified. The evidence in the subsequent paragraphs thus provides a more detailed theoretical explanation on how status is related to social networks and how it affects livelihood income.

To begin with, the concept of social status is defined from different perspectives at different times (Adams & Weakliem, 2011; Barratt, 2006; Burt, 1998; Haug & Sussman, 1971). The vast literature on sociology agreeably defined social status as a ranking of individuals/groups of individuals in a given society, based on their traits, assets and actions (Weiss & Fershtman, 1992, 1998). Theoretically, it is imperative to see how status is viewed in the context of social capital literature and assess how it gives access to the resources embedded in different social networks even with the networks that have weaker ties. Different findings at different times tried to underpin the relationship between the resources embedded in social networks and status attainment. One of the influential findings was associated with the prominent works of Granovetter (1973), Lin, Ensel, & Vaughn (1981) and Burt (1998) that served as launching pad toward understanding the relationship between social capital and status, which then resulted in the formulation of a seminal theory, that of social capital (Kanas, Chiswick, Lippe, & Tubergen, 2012). The theory of social capital is formulated with the basic proposition that social networks enhance status and economic performance because they create opportunities to access the resources embedded in the networks of others even without direct connections (Boxman, De Graaf, & Flap, 1991; Granovetter, 1973; Mouw, 2002). Social capital research has been providing reliable support to this proposition that social capital, in the form of social

networks, makes a noteworthy contribution to status attainment and thereby income. In supporting this argument, substantiated with the review of social networks studies, Lin (1999) examined a two-process theory, naming it a "mobilized social capital model." The first process focuses on the access to the resources embedded in the social networks. The second one accentuates the enlistment of social capital in the process of status attainment. According to him, along with other key variables such as education, social capital, in terms of both access and mobilization of embedded resources, augments the probability of attaining better status. Likewise, Boxman et al., (1991), Marsden and Hurlbert (1988) and Lin et al., (1981), noted that the effect of social capital is directly proportional with status attainment and argued that when social capital is high, attained status will be high, regardless of other types of capital such as human capital. Thus, the arguments support the clue that status can potentially be indicated by the extent to which one decides to participate in networks.

Notwithstanding this, in the literature of social status, various studies at different times have tried to indicate and instrument status using various factors such as education, occupation, income and wealth. Weiss and Fershtman (1998), for instance, used income and occupation as an indicator of status. De Graaf and Luijkx (1993) identified educational performance as a key variable of the status attainment model. Similarly Duncan (1961) and Nam and Powers (1983) measure status based on education. Robson (1992) and Bagwell and Bernheim (1996) tried to indicate status based on wealth. Though these findings revealed that status indeed could be indicated by the aforementioned variables, it is hard to say that these indicators really work in rural areas of developing countries, where many people have similar socio-economic characteristics such as education and wealth. This gap suggests a need to search for further indicators and instruments of status such as participation in social networks, and to empirically measure the effect that it has on livelihood income. Accordingly, in this paper an effort is made to indicate the latent variable social status using factors such as the household heads' level of

participation in social networks, their ability of getting new and valuable information from the networks, their exposure to multimedia and their access to market information. The reason for using these factors is that the initial findings in the foregoing background information in section 4.2 of this paper proved that along with other factors, rural households' status is mainly related to their level of participation in social networks and the resources embedded within the networks.

In a broad sense, individuals in a society often consider status to be linked with various assets, positions or actions that are crucial for their livelihoods. Resting on this, studies in sociology and economics have related the concept with a wide array of variables. The focus of economists has been on monetary motives that are exchanged through market transactions, whereas sociologists have recognized various social aspects, including social status (Weiss & Fershtman, 1998). Weber (1978), for instance, tried to relate social status with power. Harsanyi (1966) argued that status bestows some advantages, such as a sense of sanctuary within the group and a better opportunity to come together with other groups, which money cannot buy and which of course eventually have an economic payoff. Bernheim (1994) treated social status, indicated by popularity, as a reconciling factor in a variety of economic activities. Likewise, Smith (1937) and Yovits (1962) associated social status, measured by honor and esteem, with crucial motives of human actions, including economic decisions. Rao (2001), in his empirical work on celebrations as social investments in rural India, suggested that organizing events and actively participating in local festivals is a crucial factor in improving one's status and income. He argued that households who participate more in festivals and other local events obtain higher social status and gain access to larger networks, through which they get lower prices on food and thereby achieve better income. These findings thus substantiate the idea that participation in social networks improves household heads' status and status in turn can reinforce preferences for economic actions, including improving livelihood income at a given time and

place. This sheds light on how status within a given social context is gained and to what extent it affects livelihood income.

4.4. Methodology

4.4.1. The data, sampling and survey design

The study is based on the data collected from a survey conducted in 2014 in Degua Tembien, a district in the Tigray regional state of the Federal Democratic Republic of Ethiopia. To do this, one small town, namely Hagereselam, and six rural hinterlands, namely Micheal Abiye, Selam, Limeat, Amanit, Mizan Berhan and Endaselassei, were chosen as study areas. Purposive sampling was used to select the small town. In selecting the rural hinterlands cluster random sampling technique was used by applying a cutoff distance of 2 hours from the small town. Accordingly, two clusters, comprising three randomly drawn hinterlands each, were labeled as "nearest" and "farthest." The nearest cluster consists of the hinterlands Micheal Abiye, Selam and Limeat, and the farthest one comprises the hinterlands Amanit, Mizan Berhan and Endaselassei (see Table 4.1, Figures 4.2 and 4.3). Thereafter, a total of 260 household heads comprising 114 from the "nearest" cluster and 146 from the "farthest" cluster were drawn purposively. To select households from each hinterland within a given cluster, the Probability Proportionate to Size (PPS) technique was used. Simultaneously, in selecting the sample household heads, emphasis was also given to their level of participation in social networks. Consequently the households drawn were composed of both those having heads with active participation in social networks and those without. In doing so, questions such as "Are you a member of any groups, organizations, or associations?" and "To what extent do you consider yourself to be actively participating in the group, such as by attending events, volunteering your time in other ways, or leading the group, etc...? " were asked to determine households'

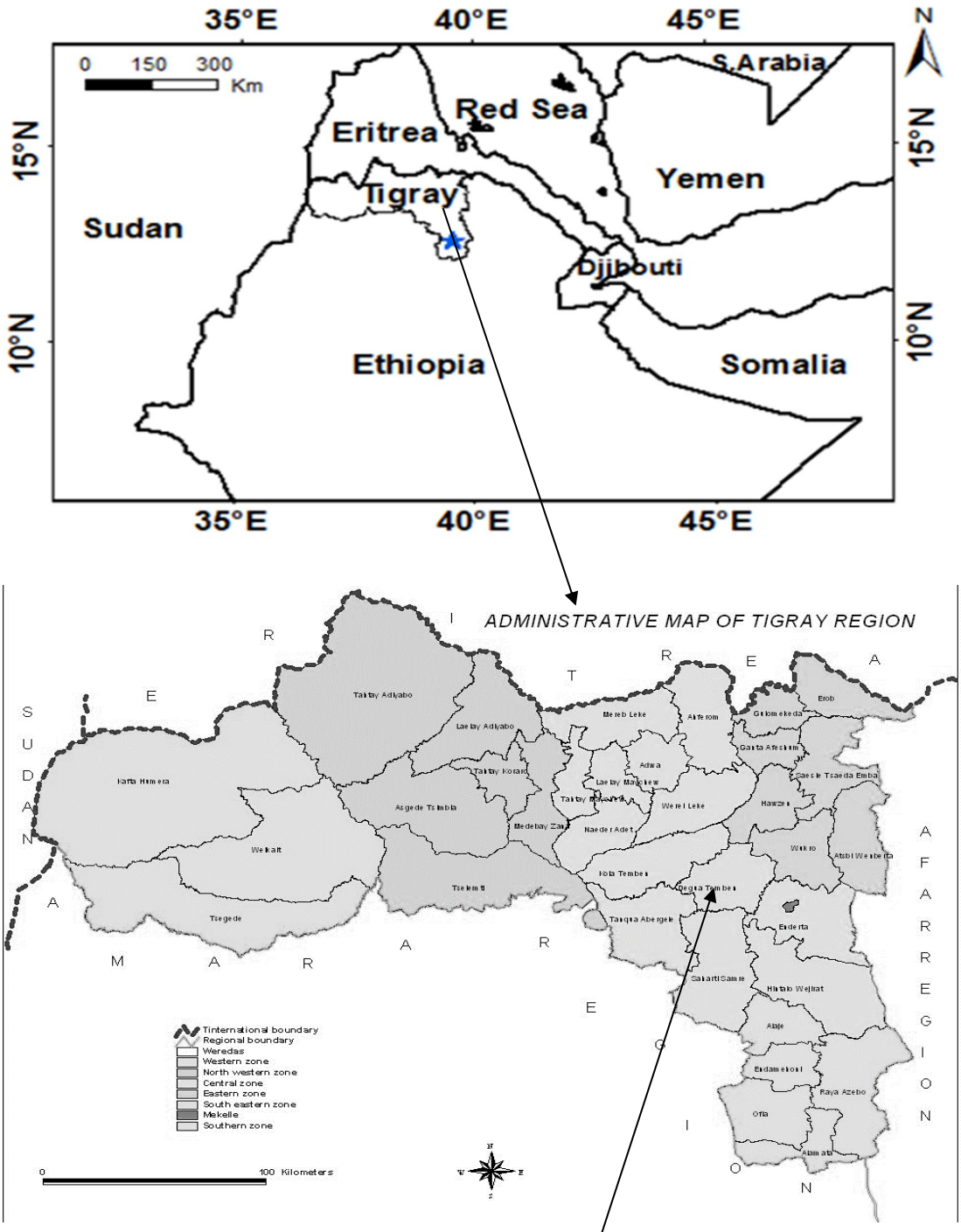
level of participation in social networks. This strategy provides us an opportunity to generate the variable social status in a way that is mainly related to participation in social networks and model its effect that it has on livelihood income from a spatial perspective.

Table 4.1: Demographic data of the study hinterlands

Study hinterlands	Total population			Number of households			Number of sample households	Clusters
	Male	Female	Total	Male Headed	Female Headed	Total		
Micheal Abiye	2854	2635	5489	995	252	1247	43	Nearest
Limeat	2444	2723	5167	952	232	1184	41	
Selam	1958	1756	3714	678	166	844	30	
Amanit	1559	1641	1641	684	143	827	47	Farthest
Mizan Berhan	2077	2069	4146	791	151	942	54	
Endaselassei	1732	1643	3375	462	327	789	45	
Grand total	12624	12467	23532	4562	1271	5833	260	

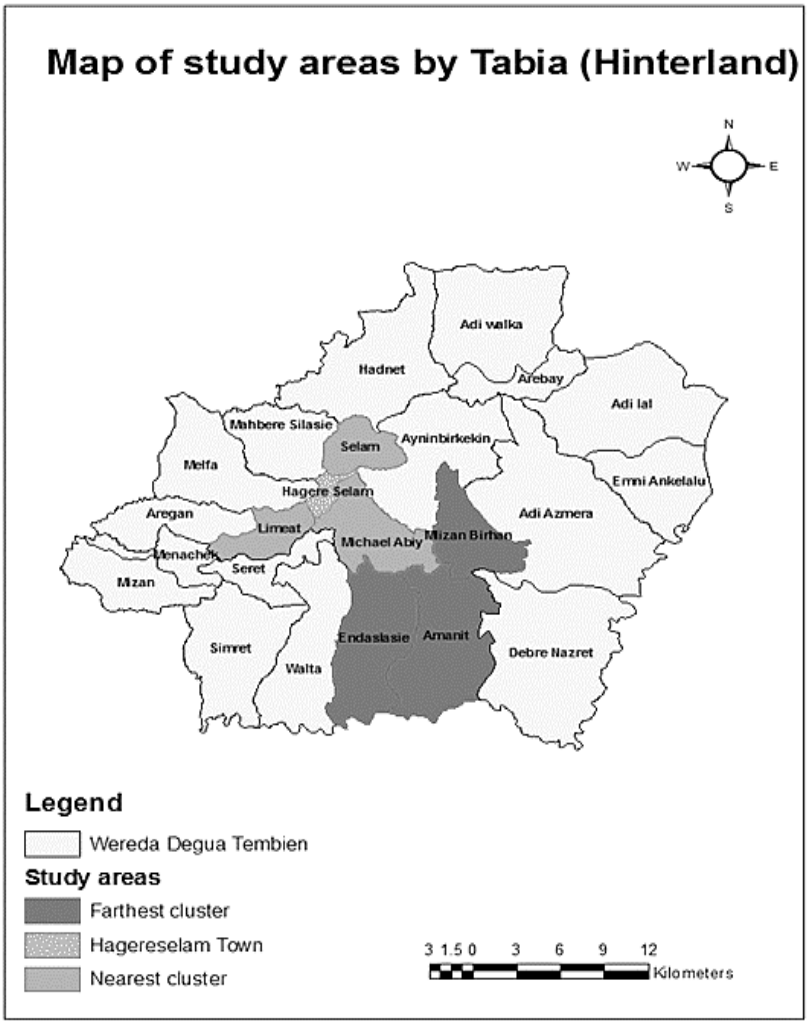
Source: Degua Tembien District Finance and Economic Development Office, 2012

Figure 4.2: Administrative map of the study area by region[iii] and district



The study area (Degua Tembien district)

Figure 4.3: Degua Tembien district/ Wereda[iv] and the study hinterlands/Tabias[v]



Source: The Central Statistical Agency of Ethiopia

4.4.2. Data types, data collection and analysis

4.4.2.1. Data type and collection

The data for the study were collected from both primary and secondary sources. The primary data were collected using household-level survey questionnaires, focus group discussions, and personal observations. Prior to the data collection process the questionnaire was pre-tested in a number of randomly selected households. It basically solicited data on demographic, socioeconomic characteristics and the income-generating activities of the sample households. Focus group discussions and observations were also employed to triangulate and support the primary data that was obtained through the questionnaire. Moreover, secondary data were collected by reviewing different published and unpublished research works, books and theses and by consulting different records and reports of governmental and nongovernmental organizations. The secondary data were used mainly to strengthen the key arguments and theories discussed and to supplement the primary data.

4.4.2.2. Data analysis

The analysis was carried out in two steps. First, a latent class analysis (LCA) was done using Latent Gold 5.0 software (Vermunt & Magidson, 2013) to determine the number of social status classes and to assign households to these latent classes. The latent class model assumes that the observations can be divided into a finite number of groups, or classes, according to some combination of characteristics (Goodman, 2002). A class is characterized by a pattern of conditional probabilities that point out the likelihood that variables take on certain values (McCutcheon, 1987). Thus, class membership is assumed to be probabilistic so that each individual can, in theory, have characteristics of each class to varying degrees, according to

their class membership probabilities (Cleveland, Collins, Lanza, Greenberg, & Feinberg, 2010; Lazarsfeld & Henry, 1968). This method allows us to create classes for the latent variable "social status" based on the similar characteristics obtained *post hoc* from the analysis of the indicator variables, rather than classes based on such easily definable *a priori* categories.

Second, the data were analyzed using both descriptive statistical analysis and an advanced econometric model. The descriptive analysis was applied to scrutinize the socioeconomic and demographic characteristics of the sample households via summary statistics such as percentages, means, standard deviations and bar charts. The estimates for the effects that the explanatory variables have on livelihood income of the households was obtained by applying a *two stage least squares* model (2SLS) estimation. As we explain later in detail, the 2SLS method provides a powerful way to deal with the problem of OLS in the presence of mismeasured repressors. Statistical analyses were performed using STATA.14.

4.4.3. Econometric modeling

4.4.3.1. Variable and model specification

This paper aims to estimate the effects of social status on households' income. Specifically it is intended to analyze which of the hypothesized repressors were associated with households' income and by how much. As discussed in the preceding theoretical framework, it was shown that the status-income relationship is characterized by the measurement problem associated with the variable social status and the fact that this measurement problem leads to a regressor correlated stochastic term. Here, livelihood income is the dependent variable. Social status becomes an endogenous latent variable in an income equation if unobserved factors in the error term are correlated with both income and status or if status is influenced by income. In

this case, the end result will be the introduction of both bias and inconsistency in all the parameters to be estimated through a correlation between the scalar errors. To correct this, several estimation methods accommodating bi-causal relationships can be used as remedies. For this particular case, a 2SLS model accompanied by an instrumental variable (Williamson, 1981) was chosen. This model is the extension of the ordinary least squares (OLS) method. It is used when the dependent variable's error term is correlated with the independent variable. In obtaining the 2SLS estimates, first, the endogenous variable in the equation to be estimated on all exogenous variables, including the instrumental variable should be regressed in the simultaneous equation model using the OLS estimator. Thereafter, in the equation to be estimated using the OLS estimator, the endogenous variable should be replaced by its fitted value variable. The estimation strategy at this point is to estimate a two-equation system consisting of equations for social status and livelihood income. The details are presented here:

$$Income = \beta_0 + \beta_1 socialStatus + \beta_2\, age + \beta_3 sex + \beta_4 off\ farmWork + \beta_5 landSize + \beta_6 MultiMedia + \beta_7 credit + \beta_8\, proxTown + \beta_9 livestock + \varepsilon_1 \quad \ldots\ldots\ldots\ldots 1$$

$$socialStatus = \alpha_0 + \alpha_1 \deg reeParticipation + \alpha_2\, age + \alpha_3 sex + \alpha_4 off\ farmWork + \alpha_5 landSize + \alpha_6 MultiMedia + \alpha_7 credit + \alpha_8\, proxTown + \alpha_9 livestock + \varepsilon_2 \quad \ldots\ldots\ldots 2$$

Where the endogenous variables *Income* and *socialStatus* denote the household's livelihood income and social status, respectively; the *β's* and *α*'s are the parameters to be estimated, and ε_1 and ε_2 are the stochastic disturbances term for the endogenous variables *Income* and *socialStatus*, respectively. The variable "household head's degree of participation in social networks" is chosen as an instrumental variable. An instrumental variable is a variable that is outside the explanatory variables and is correlated with the endogenous explanatory variable.

In order to correctly handle the problem of OLS, this instrumental variable must be correlated with the endogenous variable *(social Status*) but uncorrelated with the error term ε_2 .

As we discussed in the theoretical section, a considerable number of related theories support the idea of using the variable degree of participation in social networks as an instrument for status. For instance, Lin (1999), in his work on social networks and status attainment, supported this proposition, arguing that social capital, in terms of both access and mobilization of embedded resources, augments the chances of achieving better status. This potentially gave us a clue that households' social capital, indicated by participation in social networks, would have a direct relation with social status (see more details on sections 4.2 and 4.3).

4.5. Results and discussions

4.5.1. Latent class analysis

The latent class modeling was conducted to identify the number of classes and assign cases to the latent variable *socialStatus*. Items such as household heads' degree of participation in social networks, access to market information, ability to learn something valuable by participating in social networks, ability to get new information by participating in social networks and exposure to multimedia were chosen as indicators for LCA.

Table 4.2: Summary of the latent class models

	No. of classes	BIC	AIC	Npar
Model 1	Class1	2522.8096	2481.8387	16
Model 2	Class 2	2495.7854	2411.2829	33
Model 3	Class 3	2548.357	2420.3229	50

Source: Authors' computations

Note. BIC = Bayesian Information Criterion; Npar = Number of parameters; AIC = Akaike Information Criterion

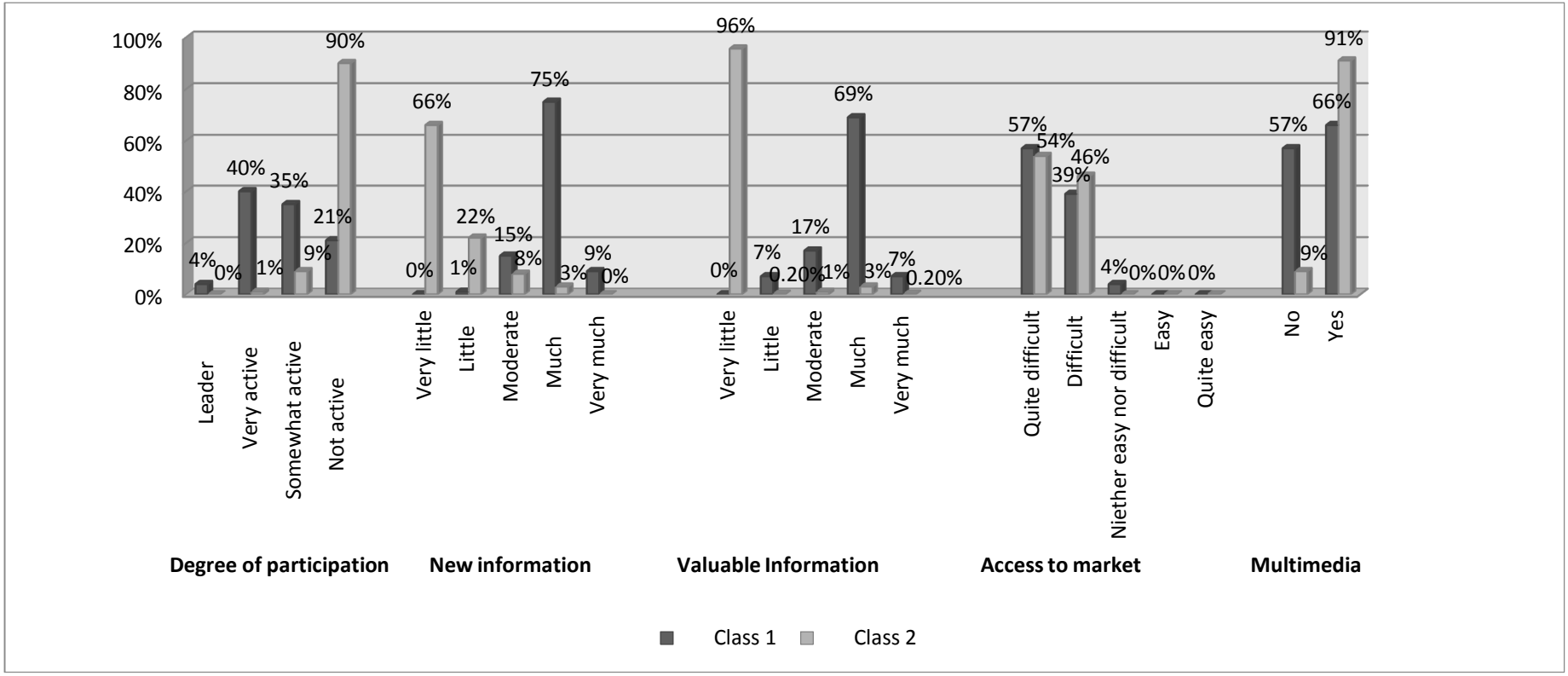
Table 4.2 summarizes the results for the 1, 2 and 3-class solutions. These different solutions are compared based on statistical information criteria like the Bayesian information criteria (BIC) and Akaike information criteria (AIC). Both the BIC and AIC penalize the log-likelihood function, but they do so differently. Whereas the AIC adds the penalty for the number of parameters (Aho, Derryberry, & Peterson, 2014; Burnham & Anderson, 2004), the BIC includes this penalty for the number of parameters as well as the number of observations (Bhat & Kumar, 2010; Kass & Wasserman, 1995).

When comparing model fits using these information criteria, the decision guide is to select the model with the lowest AIC and BIC values (Kass & Wasserman, 1995). Accordingly, the 2-class solution was selected. More specifically, the results show that compared to other solutions, the 2-class solution seems more parsimonious and justifiable. This provides a reasonable statistical platform for the identification of proper classes for the latent variable.

Figure 4.4 summarizes the results of the 2-class solution. Given the conditional probabilities of the responses in class 2, it tends to be associated with households that don't have active participation in social networks and that benefit least from getting new and valuable information from social networks. The results show that 90% of the households in this class do not have active participation in social networks. Similarly, the percentage for the probabilities of having very little chance of getting new and valuable information from social networks in this class are 66% and 96%, respectively. Though the households in this class seem to have good multimedia exposure, all of them have serious difficulty in accessing market information. This is similar to the results of class 1, where 66% of them have multimedia exposure and 96% face difficulty in accessing market information.

Contrary to this, with 35% somewhat active participants, 40% very active participants and 4% leaders, households in class 1 appear to be highly linked with active participation in social networks. Unlike class 2, the probabilities of having much chance of getting new and valuable information from social networks in this class are 75% and 69%, respectively. As one would expect from the attributes embedded in this class, they are closely related with the better status households mentioned in the background part of section 4.2 of this paper. Hence it seems logical to label class 1 as high/medium social status and class 2 as low social status.

Figure 4.4: Summary of indicators by classes



Source: Authors' computations based on original analysis

4.5.2. Descriptive analysis

Table 4.3: Summary of the descriptive statistics

Variables	Measurement attributes	Symbols	Valid N	Mean	SD	Min	Max
Dependent Variable:							
Livelihood income	• Log of total household expenditure in Ethiopian birr (ETB) per year	*Income*	260	9.06	.47	7.93	10.77
	• Total household expenditure in Ethiopian birr (ETB) per year		260	9731.63	5324.15	2800	48000
Endogenous variable:							
Social status	1=Low, 2= Middle/ High	*socialStatus*	260	1.95	.21	1	2
Instrumental variable:							
Degree of participation in social networks	1=Not active, 2=Somewhat active, 3=Very active, 4=Leader	*degreeParticipation*	260	2.20	.85	1	4
Explanatory variables:							

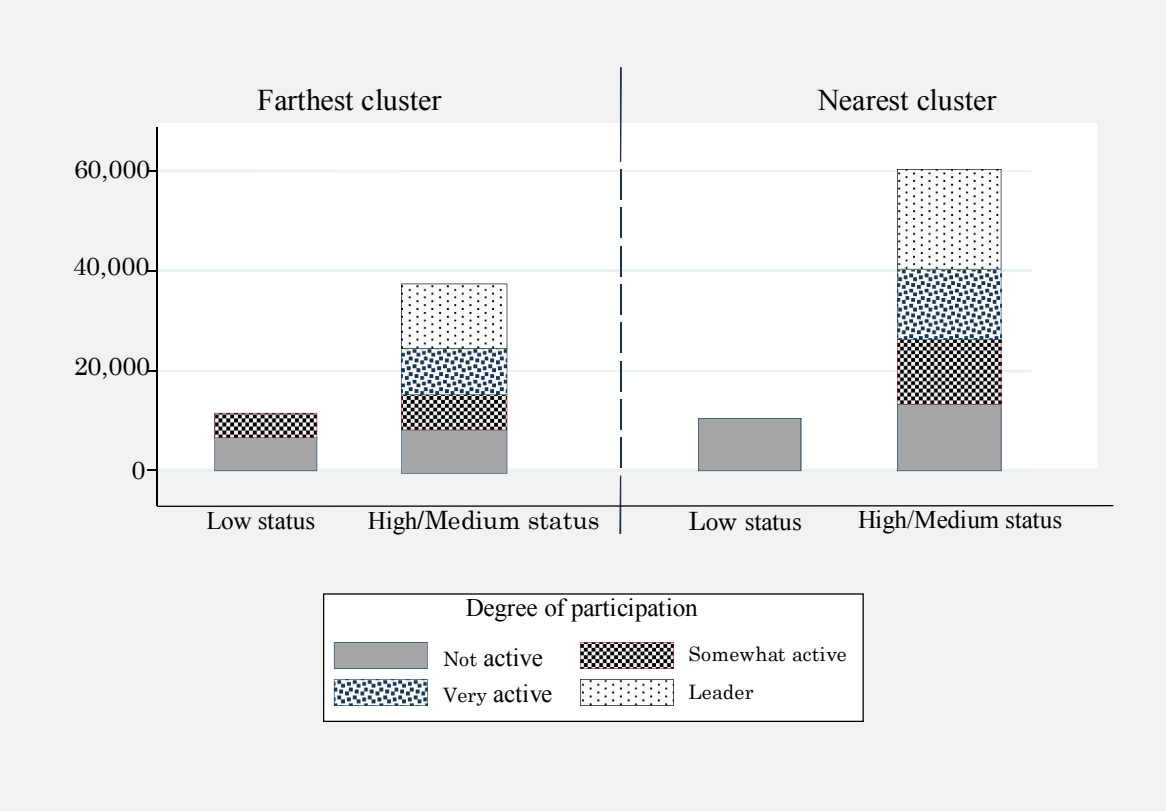
Age of household head	Continuous variable measured in number of years	*age*	260	53.51	8.07	40	80
Sex of household head	1 if female, 0 if male	*sex*	260	.11	.32	0	1
Household's spatial proximity to a small town	1 if nearest, 0 if farthest	*proxTown*	260	0.43	0.49	0	1
Off-farm work	1 if yes, 0 if no	*off farmWork*	260	.75	.43	0	1
Land size	Total land size measured in acres	*landSize*	260	.46	.42	.125	2
Ability to get new information by being a member	1=No/Very little, 2=Little, 3=Moderate, 4=Much, 5=Very much	*newInformation*	259	3.8	.74	1	5
Learned something valuable by being a member	1=No/Very little, 2=Little, 3=Moderate, 4=Much, 5=Very much	*valuableInformation*	259	3.61	.88	1	5
Livestock ownership	The number of livestock in Tropical livestock units (TLU)	*livestock*	260	3.56	.93	1.12	7.16
Credit	1 if yes, 0 if no	*credit*	260	.65	.47	0	1
Exposure to multimedia	1 if yes, 0 if no	*MultiMedia*	260	.66	.47	0	1
Access to market information	1=Quite difficult, 2=Difficult, 3=Neither, 4=Easy, 5=Quite easy	*marketInformation*	260	1.46	.57	1	3

Table 4.3 presents the measurement attributes and summary of the descriptive statistics of the selected key variables derived from the sampled households, which were later regressed in the econometric model. To begin with, the average household's income is found to be 9731.63 ETB (468 USD) per year from all income sources. This is similar and comparable to the national average of 9776 ETB (470 USD) in Ethiopia (IMF, 2013). The mean age of the household heads in the sample is 53, and about 11% of them are women. Out of the total sample households, 43% are from the nearest hinterlands closer to the case town and the remaining 57% are from the farthest ones. Though the sample households are located at different distances from the small town, 75% of the households have access to off-farm work found in the small town. This result indicates that the rural households realized that diversifying their income sources would be among the rational strategies they could use to improve their livelihoods. There has also been an increase in evidence indicating that rural households in developing countries rarely rely on agriculture alone, but often maintain a diversified portfolio of income-generating activities in which off-farm activities are major components (Barrett, Reardon, & Webb, 2001; Ellis & Freeman, 2004).

Moreover, Table 4.3 shows that the mean size of farm land owned by households is 0.46 hectares, which is smaller than the regional average of 0.8 hectares (CSA, 2007). The average livestock ownership in Tropical Livestock Units (TLU) is reported as 3.56. The access variables also show that 65% of the households have access to credit. This appears to show progress because a majority of rural households in developing countries have been characterized by limited access to credits. Notwithstanding this, during our interview with the households, we observed that some concerns were raised regarding the issues of collateral and loan maturity period. Likewise, the results show that 66% of the households in some way or another have access to multimedia. This should partially enable them to exploit information about the market and other aspects of their livelihoods.

Apart from this, the bar chart in Figure 4.5 provides a general picture of the relationship between the four core variables – households' income, social status, spatial proximity to a town and degree of participation in social networks.

Figure 4.5: Bar chart of household income by social status, degree of participation in social networks and spatial proximity to a town



Source: Authors' computations based on original analysis

As can be seen from Figure 4.5, household income differs with social status and degree of participation in social networks. Apparently, households with a higher degree of participation in social networks and better status have higher livelihood income compared to those having a relatively lower degree of participation and status. This evidence may suggest that, apart from other reasons, the households make a considerable effort to actively participate in social networks to strengthen and maintain their status in the society, which

then ultimately enables them to influence transactions that are crucial for their livelihood income improvement. The result is in line with the findings of Weiss and Fershtman (1998), who pointed out that status has an implication for households' economic performance.

We also see from the same figure that a higher level of income is attributed to the households living in the closer hinterlands, as compared with households living in the farthest hinterlands. This further supports the contention that households closer to towns have a relatively higher income than those farthest away. A possible explanation for this can be that it is easier for the households who live in the closer hinterlands to frequently visit the small town to benefit from the urban services. This enables them to directly interact with service providers to do business transactions (selling and buying) and collect information that is vital for their livelihoods (Abbay & Rutten, 2016; Baker, 1990; Tacoli, 2006).

Overall, the foregoing descriptive results give a general insight into the different key variables that should be addressed and serve as a take-off point for the econometric analysis presented below.

4.5.3. Econometric analysis

In order to achieve the objectives of the study, after a thorough review of literature, a total of eleven variables consisting of one dependent variable, one endogenous variable, one instrumental variable and eight exogenous variables were identified. Based on the p-value test for regression coefficients of the 2SLS, six variables are shown to significantly affect the dependent variable livelihood income. In further analysis below, we focus on these six significant variables. First, let us look at the assumptions and tests that the econometric models make in the 2SLS estimation.

4.5.3.1. Multi-collinearity

Before estimating the model parameters using the 2SLS with an instrumental variable, the explanatory variables were checked for a problem of multi-collinearity[vi]. Several statistical measures are suggested to detect the presence of multi-collinearity and measure its extent. Gujarati (2003) suggested the Variance Inflation factor (VIF), which we define as:

$$VIF(x_i) = \frac{1}{1 - R_i^2}$$

Where R_i^2 is the coefficient of determination obtained by regressing x_i on all the other explanatory variables. The larger the value of VIF (Dillon, Sharma, & Zhang, 2011) the more collinear the variable x_i with other x's is. As a rule of thumb, for a given variable x_i a VIF of 10 or above indicates a serious problem of multi-collinearity. As can be seen from Table 4.4, the VIF values computed for each explanatory variable are far less than 10, which indicate that there is no problem of multi-collinearity.

Table 4.4: VIF test for explanatory variables

Variable	VIF	1/VIF
Sex of household head	1.45	0.691390
Off-farm work	1.40	0.711872
Household's spatial proximity to small town	1.18	0.847634
Age of household head	1.29	0.776973
Exposure to multimedia	1.16	0.858754
Social status	1.03	0.970332
Land size	1.05	0.948546
Livestock ownership	1.02	0.979453
Credit	1.01	0.987488
Mean VIF	**1.18**	

4.5.3.2. Test of endogeneity

To empirically evaluate the use of an instrumental variable, a test for endogeneity was done using Durbin-Wu-Hausman test. The test checks whether the regressor is an exogenous or endogenous variable. In other words, this test compares the OLS and IV estimates to check for significant differences. If there are significant differences, then the regressor is endogenous. Accordingly, the results in Table 4.5 revealed that there is a problem of endogeneity because the outputs show significant differences. Hence the use of an instrumental variable in our analysis is compelling.

Table 4.5: Test of endogeneity

Tests of endogeneity **Ho: variables are exogenous**		
Durbin (score) chi2(1)	**Wu-Hausman F(1,249)**	**P-value**
14.55	14.76	0.00

4.5.3.3. Test of validity of instrument

It should be noted that a low correlation between the instrument and the endogenous variable would indicate a weak instrument. The instrument is weak if the partial F-statistic testing the significance of the coefficient of the instrument is less than 10. In our case, the F-statistic result in Table 4.6 shows that it is higher than 10, indicating that the chosen instrumental variable is strongly correlated with the endogenous variable.

Table 4.6: Test of validity of instrument

First-stage regression summary statistics

Variable	R^2	Adjusted R^2	Partial R^2	Robust F(1,250)	Prob > F
Social status	0.12	0.08	0.09	14.44	0.00

Minimum eigen value statistic = 26.07

Critical values	Endogenous regressors:	1		
Ho: Instruments are weak	Excluded instruments:	1		
	5%	10%	20%	30%
2SLS relative bias	(not available)			
	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	16.38	8.96	6.66	5.53
LIML Size of nominal 5% Wald test	16.38	8.96	6.66	5.53

4.5.4. Main results of the econometric model analysis

Table 4.7: 2SLS estimates of the regression coefficients

Variables	Estimation	
	Social status Estimates of 1st stage 2sls	Income Estimates of 2nd stage 2sls
Constant	1.65	6.84***
	(12.22)	(10.05)
Social status		0.75**
		(2.23)
Age of household head	0.001	-0.00007
	(1.03)	(-0.02)
Sex of household head	0.009	0.13
	(0.20)	(1.58)
Off-farm work	0.01	0.11*
	(0.41)	(1.83)
Land size	0.05	0.14**
	(1.70)	(2.48)
Exposure to multimedia	-0.05	0.14***
	(-2.02)	(2.68)
Credit	0.002	-0.03
	(0.07)	(-0.67)
Household's spatial proximity to small town	0.02	0.66***
	(0.90)	(13.29)
Livestock ownership	0.001	0.05**
	(0.13)	(2.43)
Instrument		
Degree of participation in social networks	0.08***	
	(5.11)	
R^2	0.12	0.41
F-statistic	3.84	
Wald chi2		274.61

N=260, Figures in the bracket are t-values in the 1st stage and Z-ratios in the 2nd stage.
P-values where: *** p<0.01, ** p<0.05, * p<0.1

The results of the first stage estimation in Table 4.7 show the relevance of the instrument variable, i.e. degree of participation in social networks. Certainly, the instrument variable is relevant because it is found to be statistically significant at a 1% probability level.

Moreover, the second-stage results of the IV estimation of the variable "household's income" in Table 4.7 show that "household heads' exposure to multimedia" and "spatial proximity to a town" were found to be significant at a 1% probability level with a positive regression coefficient, indicating that households closer to towns having exposure to multimedia are more likely to have better income than those farthest households who have no exposure to multimedia.

Likewise, according to the results in Table 4.7, the corresponding p-values of the variables "household head's social status," "size of land owned" and "livestock ownership" show that they are statistically significant at a 5% probability level with a positive regression coefficient. This indicates that household heads having better status and owning relatively more land and a higher number of livestock are more likely to have better income than those low status households having less livestock and land. Similarly, the corresponding p-value of the variable "household's access to off-farm work" shows that it is statistically significant at a 10% probability level with a positive regression coefficient, indicating that household heads with access to off-farm work are more likely to earn a significantly higher income than those households who don't have access to off-farm work.

Finally, while household heads' age, sex and access to credit describe the sample respondents, none of them were found to be significant in affecting the variable "livelihood income."

4.6. Discussion of findings and concluding remarks

Focusing on the significant variables, the foregoing findings corroborate that rural households' social status, instrumented by degree of participation in social networks, has a significantly positive effect on livelihood income. This implies that high status households have significantly higher income than low status ones. This scenario is the reality in the case area of this study, where high status rural household heads are highly capable of influencing rural market dealings and various social activities of their hinterlands, which then enable them to use this as a base to claim a relatively higher income. This is also a common trend in the other rural parts of Ethiopia and perhaps some other parts of the world, where community ties are widespread. But how is participation in social networks related to social status and how does social status in turn affect livelihood income? The results suggest that social status as instrumented by households' participation in social networks plays a key role in regulating business transactions affecting livelihood income. What this clue may imply is that high status households tend to enhance their participation in different social networks with the intention of strengthening the social bonds that they have and improving their status in the community, which in turn has an economic payback. In other words, households' active participation in social networks, as an individual characteristic, is a critical factor in enhancing their status within the society, as it enables them to be positively perceived by the society. This eventually has an economic benefit for their livelihoods. The story of one household head illustrates the point as follows:

> Hishe, aged 54, is a high status household head in the Mizan Birhan hinterland, in the Degua Tembien district of the regional state of Tigray, Ethiopia. Like any other rural household in his community, agriculture remains central to his family's survival. Hishe, in his society, is seen as one of the most highly regarded household heads due to his active and leadership role in different societal affairs and events. According to Hishe, not only does his active involvement in

> different social networks enhance his status within the society, it likewise emphatically adds to his livelihood. He says, "Besides improving the perception that other people have of me, taking part in these networks on a very basic level helped me to reinforce my economic condition." Having been well respected by his society, Hishe has been using his status as one means to regulate and minimize the costs associated with accessing markets: "As successive contact with merchants coming about because of my status clears me an approach to come to know the most recent information about the market, I might lessen the market related costs." He is convinced that not only does his status enable him to minimize the market transaction costs, it also strengthens his bargaining power and economic condition. "I managed to increase my bargaining power and save the market related costs that would have been incurred. As a result, I could be able to significantly boost my livelihood income," he says.

From the aforementioned story, it is imperative to notice how status is highly associated with participation in social networks and used by household heads to influence transactions and activities that affect their livelihood income. These empirical findings substantiate the findings of Weiss and Fershtman (1998) and Bernheim (1994), who considered status as a useful factor that can be used to influence individuals' behavior, which then may influence economic decisions and livelihood income. Hence, it is apparent in the foregoing theories and empirical evidence that social status paves a way for individuals to obtain advantages in economic transactions that have plausible positive effects on their livelihood income.

Continuing to examine the significant variables, our findings show clear links between key assets and livelihood income. Particularly, we found that households' livestock and land ownership are positively linked with livelihood income. This infers that land and livestock are still essential components of asset portfolios that rural households rely on. Likewise, access to off-farm work and exposure to multimedia appear to be positively associated with

livelihood income, implying that off-farm employment opportunities and exposure to multimedia have a tendency to improve the livelihoods of rural households by strengthening their income and information base, which are decisive for their livelihoods. Moreover, it is apparent in the findings that rural households' spatial proximity to a town has a positive effect on livelihood income, most likely since the closer households can easily visit the town and exploit the different town functions and services that are vital for their livelihoods. This finding is in line with other studies suggesting the importance of proximity as a key feature in rural development (Abbay & Rutten, 2016; Baker, 1990; Tacoli, 2006).

To sum up, our empirical findings contribute to filling in the literature gap on social status and its relationship with participation in social networks as they pertain to the effects of social status on livelihood income of rural households in a developing countries context. The study is unique in that it draws on rarely used indicators such as households' degree of participation in social networks as an instrument for social status. This creates a fertile ground on which to build a universal set of standard indicators of status that would help to indicate social status in any context and thereby to enrich the literature of social capital using the concept of social status. All in all, the foregoing findings are noteworthy in that they offer a new roadmap for further study in the enduring rich debate about social status in the developing countries context.

4.7. Notes

i. To maintain the privacy of the discussants, we use fake names throughout the case study. This applies to all case stories stated in the chapter.

ii. Informal credit association where group of individuals agree to meet for a defined period of time in order to save money together. It is a rotating fund.

iii. Region is an ethnic-based administrative territoriality of Ethiopia that is larger than hinterlands and districts.

iv. Wereda refers to an administrative unit of Ethiopia larger than tabia, similar to district.

v. Tabia is the smallest administrative unit of Ethiopia, similar to a ward or hinterland.

vi. The issue of multi-collinearity arises when there is an approximate linear relationship among two or more independent variables. This might cause the estimated regression coefficients to have the incorrect signs and smaller t-ratios, which might lead to erroneous inferences (Asteriou & Hall, 2011; Wooldridge, 1994).

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5 CONCLUSIONS

5.1. General conclusions

The overriding aim of this dissertation was to study the effects of rural households' spatial proximity to small towns, participation in social networks and status on their livelihoods. Understanding these dimensions from the theoretical and empirical points of view and analyzing their effects on the rural households requires the use of well-developed empirical models and data. To this end, empirical data taken from one small town and six rural hinterlands were used. The analysis of each theme was generally organized into chapters, and under each chapter we sought the answers to the key research questions related to the overall theme of the dissertation.

First, we aimed to measure the effect of spatial proximity to small towns on the income of the surrounding rural people. To this end, rural households composed of those headed by males and by females were selected from the six hinterlands clustered into "farthest" and "nearest." The data in some of the study hinterlands show that significant percentages of rural households are headed by women. This might imply that these women could have the security of agricultural land through the program of land certification that ensures women's access to land. It may also imply that these hinterlands are also able to provide gender-sensitive rural packages such as employment opportunities, credit facilities and other activities enhancing women's livelihoods. In any case, the data gathered from these rural households were analyzed to estimate the effect of distance to urban centers on livelihood income. In addressing this, we proposed and formulated a Hinterlands' Spatial Proximity Model (HSPM) in the context of rural livelihoods. The HSPM initially hypothesized the

spatial dimension of rural-urban linkage as a key factor for rural livelihoods and proposed social capital as an alternative means to be used by the farthest households to access town functions and services in cases where geographical advantage is absent. Results of our empirical analysis confirmed that the effect of spatial proximity to a small town significantly enhances livelihood income. This implies that rural households closer to urban centers have significantly higher income than those who are living in the farthest hinterlands, demonstrating that spatial proximity to a small town is an essential condition for escalating the rural income base, as it simplifies the rural households' capability to use the town services. Apparently, this clue leads the farthest households to develop an alternative livelihood strategy for using the town services, i.e. enhancing their social capital in a way that partially compensates for the opportunity lost as a result of physical distance.

Second, we did empirical tests to further fortify the arguments related to HSPM and examine the interaction between spatial distance and participation in social networks in relation to the different livelihood strategies and livelihood income. In explaining this, we proposed a Social-Spatial Livelihood Matrix (SSLM). The SSLM hypothesized two causal mechanisms, participation in social networks and geographical proximity, as keys for reducing transaction costs and ameliorating livelihoods. It indicates that those rural households more proximate to market towns and having active participation in social networks might ostensibly benefit by utilizing both social networks and spatial proximity to improve their livelihoods. However, in situations where these households have a much lower level of participation in social networks, spatial proximity is more useful to them for augmenting their livelihoods. In contrast, this leads the farthest households to probe for an alternative livelihood strategy that will curtail the effect of spatial distance. In tackling this, SSLM proposed utilizing social networks as an alternative livelihood strategy. Accordingly, the farthest households with active involvement in social networks might benefit greatly from utilizing these networks as a livelihood strategy to partly compensate for the benefits lost as a result of spatial distance. These findings provide a remarkable theoretical platform for devising an alternative livelihood strategy for rural households living in the farthest

hinterlands i.e. using social networks. Moreover, we generally examined social capital as a concept that plays a key role in influencing economic activities. More precisely, we put forth here the effect of households' participation in social networks on reducing transaction costs in a way that improves their livelihoods. In an attempt to take into account the resources embedded in social networks and their effects on economic transactions, our arguments rested mainly on Granovetter's theory of "social embeddedness" suggests that economic action is correlated to activities that are non-economic and denotes that non-economic actions such as participation in social networks have a significant effect on economic actions (such as transaction costs) (Granovetter, 1985). The results confirm that social capital as indicated by participation in social networks significantly reduces transaction costs resulting from geographical distance. This corroborates Granovetter's embeddedness argument and provides empirical proof on how non-economic actions affect economic actions.

Third, we scrutinized the household-level data on how social status of rural household heads affects their livelihoods and what particular variables are employed to indicate status in a developing countries context. Whereas attention was given to the economic advantages of some important variables such as spatial proximity to towns, the focus remained on examining the economic benefits earned from status. We argued that the popular indicators of status proposed in the literature of social capital, such as income, occupation, education and wealth may not be useful in indicating status in rural areas of developing countries, where the majority of the people have similar socio-economic characteristics. Alternatively, we proposed household heads' degree of participation in social networks as an instrument for status. Our argument rests, thus, on the supposition that rural households' social status, instrumented by degree of participation in social networks, has a significantly positive effect on livelihood income. The results suggest that social status as indicated by households' degree of participation in social networks considerably affects livelihood income and is central in regulating business transactions affecting livelihood income. What this

information might infer is that high status households learn to enhance their participation in different social networks with the expectation of invigorating the social bonds that they have and improving their status in the community, which subsequently has an economic remuneration. These findings substantiate the arguments of Weiss & Fershtman (1998), Bernheim (1994), Smith (1937) and Yovits (1962), who argue that the desire to attain high status has an important implication for households' economic condition. Moreover, our findings suggest that though factors such as gender of household heads are positively correlated with household heads' status, they were found to have an insignificant effect on it, denoting that gender would not impede women from procuring better status within their society. This is promising for the prevailing efforts aimed at empowering women to participate fully in economic and social life across rural areas of developing countries.

5.2. Direction for future research

Our empirical findings are different from previous studies' in that they followed a livelihoods-driven approach that deals with the social and spatial aspects of livelihoods in an economic sense. While these contribute empirically to the ongoing debate on livelihoods and create a fertile ground to scholarly enrich the notion of rural development using the concepts of spatial proximity, social capital and status, further research would be beneficial for the following reasons. First, since our empirical analyses in this dissertation were done using a cross-sectional data set, they do not lend themselves to capturing the changes in patterns overtime. In this regard, studies based on longitudinal data could convey much richer messages on how the aforementioned variables affect livelihoods. Second, in indicating status, contrary to the indicators attributed to the developed world, our study is limited to estimating the livelihood effects of status as indicated by few key variables such as households' degree of participation in social networks. However, there could be other indicators identified with different countries' contexts other than those known to the literature. Hence, comparative studies of social status in different countries' contexts would

potentially help in identifying further indicators of status, thereby helping to construct standard indicators of status that could be valid in any context. Third, though our study provides crucial clues related to livelihoods, to have a consummate picture of rural development, we would suggest for future research to focus on how to mainstream diverse, pressing issues such as gender, technology adoption, innovation and knowledge transfer into the concepts of social capital and spatial distance. Finally, our review of the literature has been limited only to those writings made in English. We know about mounting literature in the discipline, but unfortunately our language confinements do not consider such scope here. Notwithstanding this, it is noteworthy that the foregoing findings offer a new roadmap for further study on the continuing rich debate about rural development in a developing countries context.

5.3. References

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